Contractors and Engineers Monthly

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Highlights Of This Issue

- **Color on the Highway**
  A few years ago "color in the kitchen" became a slogan for home-makers. Now this slogan, paraphrased to "color on the highway," may become the theme of road builders if an experiment in coloring one of the lanes of a new 8.71-mile concrete highway in Kentucky proves successful.
  See page 2.

- **Varied County Operations**
  In addition to the usual duties of road construction, maintenance and snow removal, Hennepin County, Minnesota, has the responsibility for maintaining the level of one of Minnesota's many lakes which is the center of recreational activities in that portion of the state.
  See page 2.

- **Snow Removal in Nutmeg State**
  The Connecticut State Highway Department calls on all state-owned trucks, not only those of the Maintenance Division but of all other divisions, and equips them with state-owned plows to keep its 2,825 miles of highways open to traffic during the winter months.
  See page 7.

- **Servicing Grading Jobs**
  In the old days when highway jobs might be 20 or 25 miles long, it was entirely feasible to set up a complete machine and service shop to take care of the equipment. Now, however, most highway jobs are divided up into much shorter units, and economy demands more mobile service shops. One Minnesota contractor has solved this problem by setting up very compact but complete shops in trailers which can be moved readily from one job to the next.
  See page 11.

- **Bituminous Resurfacing**
  Widening and resurfacing main roads have taken on an even greater importance in consideration of the place highways must play in our defense program. Delaware has an extensive program under way for improving the du Pont Boulevard, the work on one section of which is described in this issue.
  See page 31.

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DELAWARE AQUEDUCT

Gigantic Water Supply Project Includes Dams, Reservoirs, Tunnels and Highways

$298,000,000 Job Will Add 540 Mgd to New York City's Water Supply System; Work On Rapid Schedule

(*Photo on page 40*)

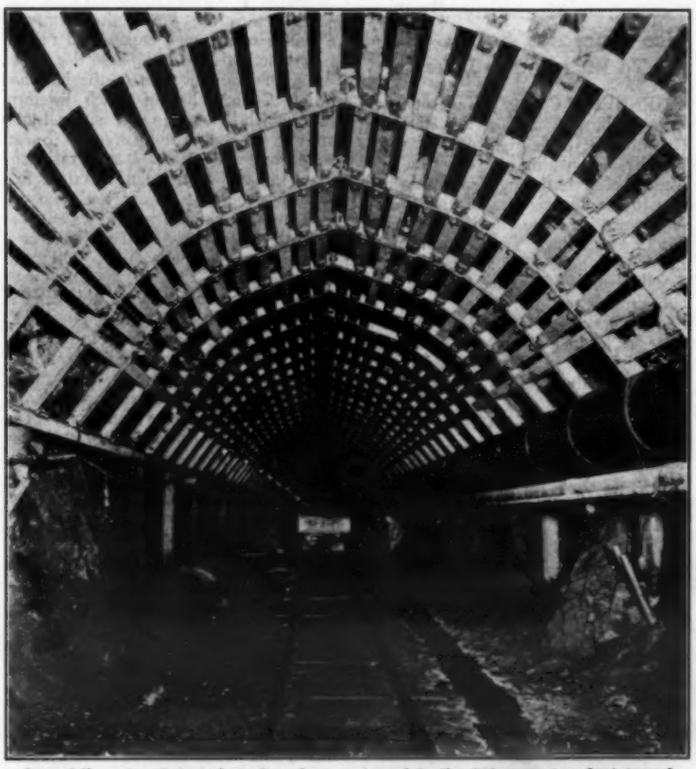
Based on Information Furnished by Leonard P. Wood, Designing Engineer, Board of Water Supply, New York City

✦ THE Delaware Aqueduct project for a greater water supply for New York City will add 540 mgd to the 989 mgd safe yield of the city's present water supply system. Its urgency is indicated by the fact that consumption in 1939 exceeded the safe yield by 36 mgd. When completed, this $298,000,000 project will comprise three impounding reservoirs, each with a 200-foot rolled earth dam, having a combined available capacity of 232,000 million gallons, and 117 miles of aqueduct, all in tunnel.

Work valuing more than $100,000,000 has already been done, the first dam and 85 miles of tunnel are under construction, and six contracts have been completed at a cost of about $13,000,000. Fifteen contractors holding sixteen contracts are earning $5,000,000 a month. With able and experienced contractors, every major construction contract now in force is up to or ahead of the rapid contract schedule.

All funds are provided by the sale of city bonds against the general credit of the City without Federal aid. The first stage, including the Neversink and Rondout reservoirs, their connecting tunnel and the main aqueduct will cost about $236,000,000. The first contract was awarded January 22, 1937, and the aqueduct and first reservoir, Rondout

(*Continued on page 8*)



One of the many types of steel roof support used in the Delaware Aqueduct tunnel. This is a light type for 15-foot tunnel in blocky ground, with 5-inch 8.9-pound H-beam ribs on 4-foot centers, and double 6-inch 14.75-pound wall plates. The ribs rest on 2-inch pins and 10 x 10-inch posts, and the lagging is 6-inch 8.2-pound channels resting on and clipped to the lower flanges of the ribs. Note the 26-inch ventilating pipe, 6-inch high-pressure air and water lines for drills on the right, and the 2,300-volt parkway cable on the left.

Job Involves 117 Miles of Aqueduct, All in Tunnel, Divided into 11 Contracts Held by 10 Contractors

(*Photos on page 40*)

✦ THE Delaware Aqueduct project, totaling $298,000,000, includes 117 miles of tunnels to bring additional water supply from upper New York State to join the 20-mile pressure tunnel, to distribute the water within the city, put into service in 1936.

Work on Tunnels

Except for the portion of the Rondout-West Branch tunnel about to be excavated under Contract 340, the tunnel is being built under eleven contracts held by ten contractors. Three contracts include the six shafts not included in the preliminary shaft contracts; all include the lining and grouting of the tunnel and the completion of all work in and around the shafts. On completion, 12 of the 31 shafts will become waterway shafts surmounted by large gate houses and carrying the entire tunnel flow down to or up from the tunnel. Six shafts will contain risers, steel pipes embedded in concrete and concrete-lined to a 4 or 6-foot diameter, connecting the tunnel with underground valve chambers at the shaft heads for delivering water to adjacent communities, for a connection with the Catskill Aqueduct or for receiving water from the adjacent Croton reservoirs. Three drainage shafts with their superstructures will contain pumps, cages, hoists, etc., for unwatering, and access to the tunnel for inspection and repair. The drainage shafts will also contain risers to supply water to neighboring communities. Two shafts will serve as access and surge shafts; the remaining eight are for construction only and will be sealed at the top and bottom.

All tunnel contractors have installed heavy equipment of large capacity at high initial costs. Except in very treacherous ground, all are excavating the entire section in one operation. On all contracts, five to nine drifter drills are mounted on a drill-carriage or jumbo running on track. All contractors are using electrically-operated mucking machines, some form of mechanical car passer, steel cars of 3½ to 6-yard capacity, electric locomotives usually of the storage-battery type, and mechanical car dumpers. One contractor has also used mine locomotives equipped with diesel engines designed to produce an exhaust free from carbon

(*Continued on page 14*)

Colored Slab in Truck Lane On New Road in Kentucky

F. C. Gorrell & Sons Pours 8.71 Miles of Concrete Road Around U. S. Military Post at Fort Knox

✦ THE highway contract, FAP 79-D(2)S, 8.71 miles in length, recently completed by F. C. Gorrell & Sons of Russellville, Ky., on U. S. 31-W and U. S. 60, partly within the famous "gold mine" reservation at Fort Knox, Ky., had a number of unusual features. There were several very large rock cuts; the 33-foot reinforced-concrete pavement was poured as a 22-foot 9-7-9-inch slab with a steel plate down the center to form a plane of weakness; tie bar dowels were used between the 22 and 11-foot slab; 10,000 feet of the 11-foot slab over a hill was colored with red metallic oxide; one bag of natural cement containing 0.2 per cent prime beef tallow was used for each five bags of portland cement; and one section was poured with a special ground portland cement containing Vinsol resin.

A temporary roadside quarry, described in the accompanying article, was set up on the old winding section of U. S. 60 to furnish limestone aggregate for the concrete.

The Rock Cuts

In order to maintain a maximum 6.5 per cent grade on this project and a minimum sight distance of 1,400 feet, several rather large rock cuts were necessary. The largest of these near the north end of the contract was in exceedingly hard limestone and required the removal of 160,000 cubic yards of rock over a distance of 1,600 feet and with a maximum depth of cut of 105 feet. Several other cuts, either side-hill or through cuts, were equally difficult but none quite as large as this mammoth of the job.

Batching and Water Supply

The batching plant was set up at approximately the center of the job on a knoll to the east of the right-of-way. Both sizes of stone were trucked from the roadside quarry, operated by Nally & Mudd, about 2 miles from the batching plant. Sand was hauled from West Point on the Ohio River, a distance of about 6 miles, and all aggregates were stockpiled and then rehandled by a Bucyrus-Erie crane with a 45-foot boom and 1½-yard Blaw-Knox clamshell bucket. The hauling of the aggregate and of the weighed batches was done under a subcontract.

The batching plant for aggregates consisted of two 52-ton Blaw-Knox weighing batchers, one for coarse aggregate and sand, and the other for the fine stone. A fleet of fourteen 2-batch trucks did the hauling of the batches, backing under the two aggregate batchers and then proceeding about ¼ mile to the Blaw-Knox bulk-cement plant, powered by a Hercules engine, where the cement was added to the batches. The steel cement cars were spotted and moved by a Jaeger single-drum hoist driven by a Hercules engine.

Two sizes of coarse aggregate were used on this contract, the larger stone passing a 2½-inch screen and being retained on a 1-inch screen, while the smaller stone passed a 1½-inch screen and was retained on a 10-mesh sieve. The batch weights were:

Large stone	1,558 pounds
Small stone	1,176 pounds
Sand	1,675 pounds
Cement	752 pounds

This made an 8-bag batch on the ratio of 1½ barrels of cement per cubic yard of concrete.

At the aggregate-batching plant two

(Continued on page 32)

C. & E. M. Photo

Through this 1,600-foot hard limestone cut, slow truck traffic moving upgrade must use the red-tinted lane.

Temporary Quarry Opened By Nally & Mudd Furnished Crushed Stone for Paving In Fort Knox Reservation

✦ A VERY well-planned complete quarrying, crushing and screening plant was set up by Nally & Mudd of Springfield, Ky., about 2 miles north of the batching plant of F. C. Gorrell & Sons, contractor for 8.71 miles of 33-foot concrete highway through the Fort Knox Military Reservation in Kentucky, to supply stone for the concrete pavement. The quarry was a side-hill opening directly off the old location of U. S. 60 which was being relocated.

Drilling, Blasting and Loading

Twenty-five feet of earth overburden was removed by scrapers and used to build a ramp to the top of the primary crusher. The side walls of the ramp were made of woven saplings tied with cables.

The face of the quarry, as worked, was about 200 feet long, extending back about 90 feet from the road, and a maximum of 29 feet high which was worked in two equal benches. Air for drilling was furnished by a Davey 310-cubic foot air compressor driven by a Caterpillar 11,000 diesel engine direct-connected to the compressor. This unit was mounted at the top of the quarry and the air carried by a 1½-inch pipe to the three Ingersoll-Rand Jackhamers which did

(Concluded on page 17)

Re-spreading top soil on finished slopes.

Handling of Top Soil Aids Roadside Job

Growth of Grass and Sod Speeded On New Location of Texas Road by Use of Top Soil On All Slopes

✦ ON a 9.589-mile grading project in Smith County, Texas, a new procedure in the treatment of slopes with top soil and sodding was tried out, with results so satisfactory that it has been followed out on subsequent work presenting the same problems. State highway engineers report that much of the success of this job was due to the eagerness with which the Superintendent for the contractor cooperated in the experimental work and his willingness to exceed specifications of the contract in order to make the experiment a success.

During the construction of this project all available top soil was saved to promote the growth of Bermuda grass on the finished roadway slopes. This was particularly necessary on this highway as the exposed surfaces of the slopes were of sterile red clay on which sodding would not grow.

Before starting the grading operations at any one balance point, the contractor stripped all top soil from both

(Concluded on page 13)

Varied Operations In Minnesota County

Hennepin County Maintains Extensive Highway System; Also Operates Seven Pumps To Raise Lake Levels

✦ HENNEPIN County, Minnesota, contains the largest city of the state and 270 miles of state highways, of which 66 miles are within the city limits of Minneapolis, radiating from the Hub City to the far corners of the county. Supplementing these arteries, the county maintains a highway system of 574 miles in its 560 square miles. There are only 19 miles of concrete or concrete base with asphalt top, the major portion of the highway system comprising 260 miles of bituminous oil treatment and 312 miles of gravel surfaced roads. There are only 2 miles of dirt road in the entire county and these are across a marsh and are seldom used except in the driest summer weather.

The other County Highway Department activity is the responsibility for maintaining the elevation of Lake Minnetonka. This large lake in the southwestern portion of the county is a center of summer homes and recreational activities. In the last decade of dry years the elevation of the lake has fallen 7 feet, baring much swampy land which has overgrown with cat-tails and other undesirable weeds. In an endeavor to regain the lost elevation of the lake, the county has installed five 12-inch deep-well pumps and two 10-inch pumps, which bring up water from a depth of 400 to 500 feet and deliver it to the chain of lakes contributing to Minnetonka.

The Jordan sandstone of this area is topped with Shakopee limestone. The sandstone is loose and bears large quantities of water. Sometimes where it is more compact it is necessary to blast the bottom of a well to provide a sufficiently loose stratum for easy pumping. The pumps are set 100 to 120 feet below ground elevation while the normal water level is from 30 to 60 feet below the surface. It is the plan of the county, in spite of rapid evaporation from the surface of the lakes during the summer, to add about 1½ feet per year to the level to bring the elevation back to normal. The pumps installed include two Layne-Bowler, one Peerless, one Fairbanks-Morse, one Pomona, one Sterling and one Cook deep-well pumps, which have been installed as follows: the first at the west end of Long Lake, delivering 2,700 gpm; the second delivered 2,500 gpm to Christmas Lake, which has not overflowed for about 20 years; the third delivering 2,300 gpm at the east end of Long Lake; Gleason Lake, which has not overflowed in 4 years, is having 1,200 gpm added to its volume; another pump is delivering 3,000 gpm to Galpin Lake at Excelsior, which has raised the elevation 7 feet and greatly increased its area; an old well in Wayzata, abandoned by the village because of its high iron content, has been taken over by the Hennepin County Highway Department, which has installed its own pump and is delivering direct to Lake Minnetonka. An arrangement has been made with the village to provide an emergency supply from this well if necessary; the last pump has recently been installed at the outlet of Lake Minnetonka at the dam so that it can pump either into the Lake or into Minnehaha Creek, and, therefore, recreate Minnehaha Falls, one of the scenic features of the country.

The pumps have necessarily been installed at points east of a north and south line dividing the lake areas in half because the water-bearing Jordan sandstone runs out at about that point. The raising of the level of Lake Minnetonka, into which all of these smaller lakes drain, has greatly increased the value of the many estates around this section of the lake, and has also recreated large areas where the lake had disappeared, making this land available for lower priced summer cottages, which are very popular among Minneapolis residents.

Organization

The County Highway Department of Hennepin County is comprised of five County Commissioners elected for four-year terms, three at one time, and two two years later. They take office on

(Concluded on page 30)

C. & E. M. Photo

Red metallic oxide was hand-sprinkled behind the longitudinal finisher in the slow truck lane and then worked into the surface with long-handled floats.

New York specifies BLACK TOP • BLACK BASE

for 10 miles of State Highway

In this 10-mile New York State highway project a TEXACO Asphaltic Concrete surface (cold laid type) is being laid on a TEXACO Asphalt Macadam base (penetration type).

The TEXACO Asphaltic Concrete surface was laid on half the width of the highway at a time.

A view of the finished TEXACO Black Top • Black Base highway before completion of the shoulders.

New York State recently indicated its opinion of BLACK TOP • BLACK BASE highways when it chose this type for 10 miles of State Highway in Greene and Ulster Counties.

A BLACK TOP • BLACK BASE highway is resilient from sub-base to surface. This important shock-absorbing quality adds to its life and reduces maintenance cost. The bond which forms between a BLACK BASE and a BLACK TOP is so perfect that the two courses virtually become one. This is another characteristic which makes for greater durability.

For its 10-mile BLACK TOP • BLACK BASE project, New York State chose an asphalt macadam foundation constructed by the penetration method. The wearing surface is asphaltic concrete of the cold-laid type. More than 400,000 gallons of TEXACO Asphalt went into the building of this highway, New York State's second largest asphalt project of 1940.

For engineering assistance in designing a Black Top • Black Base street or highway, write our nearest office.

TEXACO ASPHALT

TEXACO REG. U.S. PAT. OFF.

THE TEXAS COMPANY, Asphalt Sales Department, 135 East 42nd Street, New York City

Chicago Kansas City Houston Jacksonville Philadelphia Richmond Boston

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THEODORE REED KENDALL, Editor

EDGAR J. BUTTENHEIM ..... President
GEORGE S. CONOVER ..... Vice President
DONALD V. BUTTENHEIM ..... General Manager
O. E. POTTER ..... Managing Editor
MYRON MacLEOD ..... Advertising Manager
HERBERT K. SAXE ..... Treasurer

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The Tacoma Bridge Failure

The first news of the failure of the Tacoma Narrows Bridge on November 7 reached us via an early-morning broadcast. Toward the end of the report the newscaster stated that the structure "was built by a private contractor" in a tone which seemed to imply that something was very wrong with the manner in which the contractor had performed his work.

The public still seems to have the impression that contractors are in the habit of cutting corners, "putting over fast ones," and generally not doing a first-rate job. A contractor's reputation is his most valuable continuing asset, because the personnel of his construction crew and even the equipment employed changes from one contract to the next. Therefore every reputable contractor employs a superintendent of experience and integrity to direct the progress of his work.

The checks and inspection by every Federal, state and semi-public agency, through resident engineers and inspectors, also prevent deviations from good practice or from the plans and specifications. Thus, because of the sincere desire of the management of contracting organizations to maintain their reputations, and the governmental unit's insurance of careful adherence to all design details by every employee of the contractor, the public is assured of competent work.

The Tacoma Bridge failure was not the result of carelessness in design, construction or maintenance but rather the result of building something larger than ever before and finding that the knowledge of fundamental design was not sufficient to insure the complete integrity of the new structure. It is most regrettable that this failure occurred to mar the record of bridge construction maintained so well since the Quebec Bridge fell during erection 33 years ago. That too was, in fact, a failure of the same type. The engineers of that day were designing beyond the limits of the then-existing knowledge of the effect of size on the design and methods of construction.

It is distinctly heartening to learn that even at the time of the failure of the Tacoma Bridge careful tests on a scale model in a wind tunnel had indicated corrective measures which will be beneficial in reconstructing the bridge and preventing a recurrence of the peculiar gyrations to which the first structure finally succumbed.

Canada's Defense Highways

Much thought is now being given to defense highways in the United States, a subject which is to be the theme of the American Road Builders' Association meeting in New York next month, as well as of the January issue of CONTRACTORS AND ENGINEERS MONTHLY. Our country is already pledged to the defense of Canada and already, before there is even a hint of war on these shores, we have a commission touring Canada studying mutual defense problems.

Just what do Canada and the Maritime Provinces possess in the way of defense highways? Those who have motored to the Gaspe can answer for that area,—nothing worthy of the name. Nova Scotia is somewhat better off, but not sufficiently to strengthen the hearts of those in charge of mobile coastal defense units, and these are all local highways. What of inter-province and transcontinental highways and railways? Only two rail lines cross the continent north of our borders, the Canadian National and the Canadian Pacific Railways. Should any untoward event even temporarily paralyze traffic on these lines, complete dependence would necessarily be placed on the transcontinental highway system of the Dominion for the transfer of troops, equipment and munitions from coast to coast.

Does such a transcontinental highway link actually exist? "Of course," would be the answer of most, "with possible exceptions in the Canadian Rockies." But what really exists is a transcontinental highway unbroken from the Pacific Coast through the provinces of British Columbia, Alberta, Saskatchewan and Manitoba, but in the province of Ontario, where highway construction is the most advanced, we find not one break, but two, in this essential defense artery.

These two missing links occur in Ontario on alternate routes, one of 160 miles between Schreiber and Montreal River on the southern route which hugs the shore of Lake Superior, and the other a break of 120 miles between Geraldton and Hearst through a flat agricultural belt. These two links part company east of Port Huron and join at North Bay, continuing on to Montreal and through to Halifax.

Canada offers no complete transcontinental highway for motor transport from ocean to ocean and similarly the United States has no outstanding highway capable of handling greatly increased traffic from military sources running along its northern border. U. S. 2 in Maine, New Hampshire and Vermont, together with U. S. 20 and U. S. 6, connect the eastern manufacturing section with the midwest. Then U. S. 2 comes into being again in Northern Wisconsin, and carries on through Minnesota and across to the State of Washington at Spokane where U. S. 10 carries on to the coast.

We would urge the Defense Commission of Canada and the United States, which includes the ever-traveling Mayor of New York City, to give serious thought to the transcontinental highways of Canada and the United States which might serve to supply military and air bases between the two coasts. Dominion and Federal funds can be used most effectively to assure construction of missing links and the strengthening of weak links in the boundary transcontinental highways.

"Roads for Defense" Will Be Theme of ARBA Convention

"Look, listen and learn" will be the motto for road builders at the 1941 Convention of the American Road Builders' Association in New York January 27-31.

Convention sessions will provide abundant ammunition for continuing the war on obsolete highways, with discussions on roads for defense, legislation affecting road building, airport construction, technical problems, safe highways, diversion, and public relations.

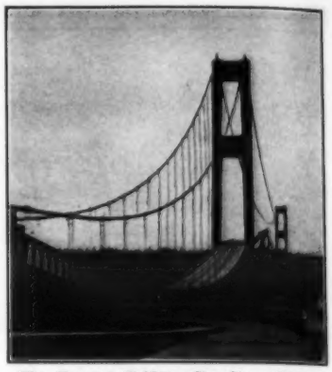
Typical of the outstanding programs planned are the agenda for highway contractors' clinics. Addresses will include "Stop Thief—An Anti-Diversion Program for Contractors" by E. E. Duffy of the Portland Cement Assn.; "Current Federal Laws and Regulations Affecting the Highway Contractor" by Francis J. Kelly, ARBA General Counsel; "How to Reduce Compensation Payments" by W. H. Seymour, Liberty Mutual Insurance Co.; "Depreciation and Rental Schedules for Equipment" by Eldon M. Farnum, Geo. F. Smith Co.; and "Pitfalls of Bidding" by Prof. Walter G. Sadler, University of Michigan.

ARBA President and Ohio Director of Highways Hal G. Sours will deliver the opening address at the "Roads for Defense" Forum and others scheduled to speak at this meeting are R. M. Smith, Deputy Minister of Highways of Toronto; E. Donald Sterner, New Jersey State Highway Commissioner, on an east-coast express highway; Gen. Robert Lee Bobbitt, Member of the Texas Highway Commission, on "We Learned a Lesson" and George E. Spargo of the New York City Department of Parks.

County officials will discuss the importance of county highways to national defense and hear reports on legislation, finance and administration, technical problems and governmental relations.

Inspection trips around New York and New Jersey will take road builders to many modern highway developments in the vicinity, including tunnels, bridges, parkways and express highways.

A particularly gala evening is planned for the annual banquet at the Waldorf-Astoria on January 29, with many famous stars participating in the Mardi Gras program. Veteran road builders will frolic at the Old Timers' Reunion, and delegates from "south of the border" will make merry with their northern neighbors at the Pan-American Fiesta.



The Tacoma Bridge after its collapse on November 7.

W. R. Young Takes New Post

Walker R. Young, Supervising Engineer of the Central Valley Project in California, has left that post to take over his new duties as Assistant Chief Engineer of the Bureau of Reclamation, U. S. Department of the Interior. R. S. Calland, who has been Assistant Supervising Engineer under Mr. Young, will serve as Acting Supervising Engineer pending the appointment of Mr. Young's successor.

Mr. Young, who has been with the Bureau of Reclamation since 1911, has been in charge of the Central Valley Project for five years, after serving as Construction Engineer at Boulder Dam. Mr. Calland also served on the engineering staff at Boulder Dam, and was transferred to the Central Valley Project in 1937.

New York Leads in Diversion

The doubtful distinction of leading in the amount of motor vehicle tax money diverted to non-highway purposes again goes to New York State. Last year over $75,000,000, or more than three-quarters of the state's total road imposts, was diverted for other purposes.

"It's a germ known as unpreparedness, Sam—a good dose of this will help!"

New Bulletin "Tells All" On Wheel-Mounted Crane

The wheel-mounted crane manufactured by the General Excavator Co., Marion, Ohio, is described by means of word-and-picture stories in a new bulletin recently issued by that company. Called the General Supercrane, the machine is said to be an integrated engineered unit with one operator, one cab, one engine and one set of controls. According to the manufacturer, it has a travel speed ranging up to 10 mph and faster, and a load rating of 5,000 pounds at 50-foot radius in 360-degree operation. Chapter headings in this bulletin include lifting capacity, mobility, maneuverability and stability, and working views of the machine in use show typical operations as a crane, clamshell, drag-line, pull shovel and pile driver.

Copies of this bulletin may be obtained by those interested direct from the manufacturer, by mentioning this item.

Winter Heating Equipment

As if highway engineers and construction men didn't have enough problems to solve, every year winter comes along to add to them. It isn't possible for all of us to move our jobs to the sunny southland, so the next best thing is to make them as easy as possible, in spite of old man winter.

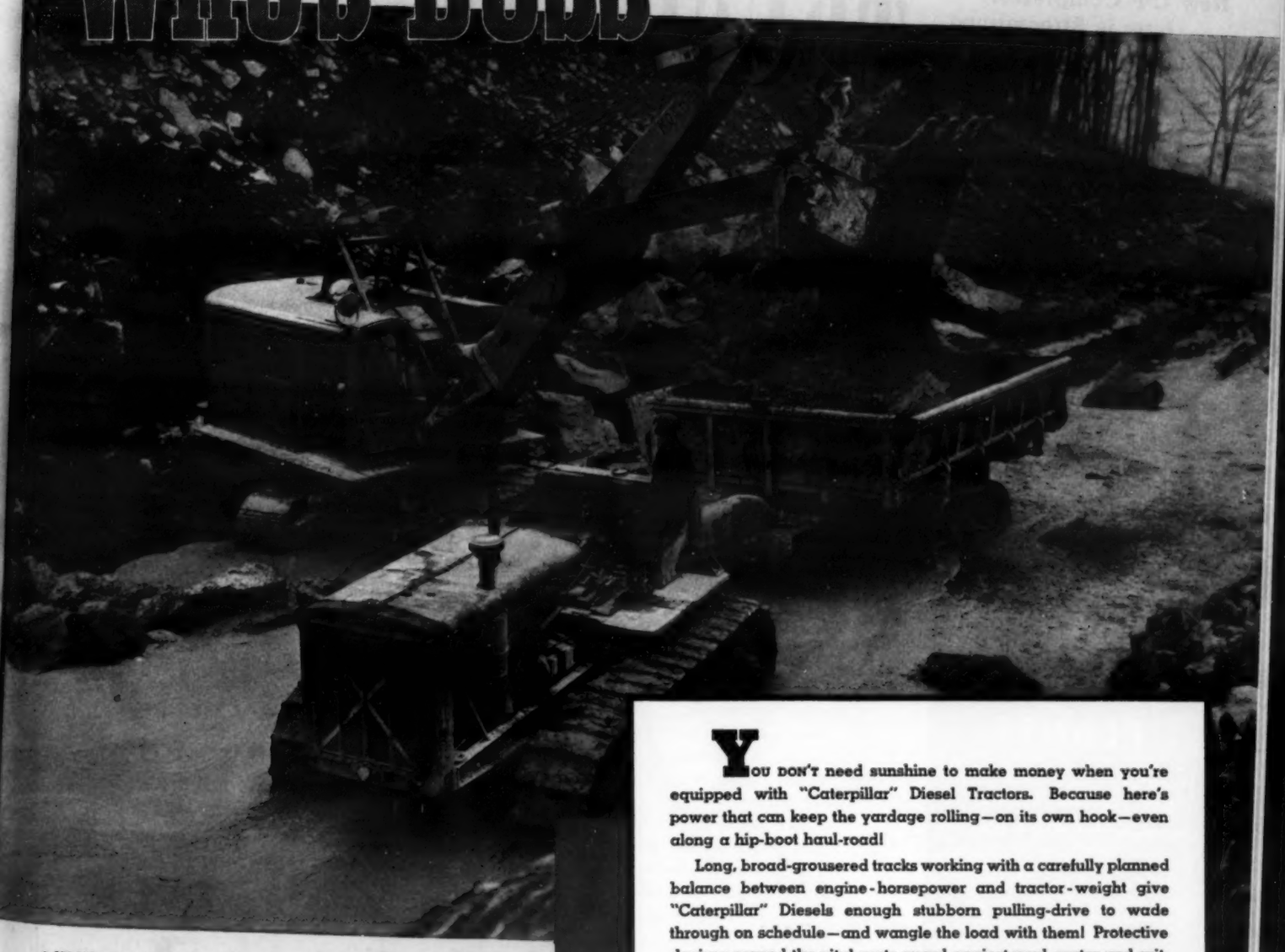
The Aeroil Burner Co., Inc., West New York, N. J., is making its contribution to the solution of this problem by issuing in one booklet the information on its complete line of winter heating equipment. This includes Aeroil heaters for concrete mixers, portable coil water heaters, oil-burning salamanders, steam thawing outfits, thawing torches, ground thawers and accessories.

Copies of this Catalog A on Aeroil equipment designed to produce winter work at summer speed may be secured by interested contractors and state, county and township engineers direct from the manufacturer or from this magazine.

Painting Creosoted Wood

"The Painting of Creosoted Wood" is the title of a new leaflet recently issued which describes seasoning after treatment and gives directions for painting creosoted posts and poles with aluminum paint. Copies may be secured direct from the Wood Preserving Corp., Pittsburgh, Penna., by mentioning this magazine.

WHO'S BOSS YOU OR THE WEATHER?



• 275,000 yards of earth and rock being moved during Spring thaw and rains by a fleet of "Caterpillar" Diesel D8 Tractors and Athey wagons. Relocation of State Highway 271, near Johnstown, Penna. Harrison Construction Co., Pittsburgh, had the contract.

CATERPILLAR

DIESEL ENGINES AND ELECTRIC SETS
TRACK-TYPE TRACTORS • ROAD MACHINERY

You don't need sunshine to make money when you're equipped with "Caterpillar" Diesel Tractors. Because here's power that can keep the yardage rolling—on its own hook—even along a hip-boot haul-road!

Long, broad-grousered tracks working with a carefully planned balance between engine-horsepower and tractor-weight give "Caterpillar" Diesels enough stubborn pulling-drive to wade through on schedule—and wangle the load with them! Protective devices around the vital parts guard against mud, water and grit. Easy maneuverability gives quick spotting under the shovel.

Get right down to it, and you'll find that "Caterpillar" Diesels are engineered to handle your work at a profit under just about any conditions you'll run up against. And on top of their weather-beating, load-moving power, you get a fuel-economy that cuts your costs by the hour—and a rugged dependability that means less down-time! See your nearest "Caterpillar" dealer or write direct to the factory for further information.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

New streamlined models of C-P portable air compressors.

New C-P Compresser; Line is Streamlined

In keeping with the modern trend toward streamlining, the Chicago Pneumatic Tool Co., 6 E. 44th St., New York City, is now offering its complete line of portable air compressors in a streamlined design and, in addition, has announced an entirely new type and size.

This new C-P 500-cubic-foot diesel-driven portable compressor, the PO-8, has two low and two high-pressure cylinders located on each side with an included angle of 90 degrees. Its features include those of the C-P line, such as Simplate valves, inlet-valve unloading, pressure lubrication, multiple-disc clutch, and sectional intercooler. It is available mounted on steel or pneumatic tires or on skids.

Power is furnished by a Caterpillar 6-cylinder 5¾ x 8-inch engine developing 132 maximum hp at 1,000 rpm. The engine speed varies automatically in direct proportion to the demand for air, between 50 and 100 per cent of the compressor output. When the demand for air falls below half capacity, the compressor is unloaded by holding open the inlet valves while the engine continues to run at half-speed. When the air consumption increases, the compressor reloads at half-speed and then continues to operate at a speed required to meet the demand.

Bulletin 758 containing further details on the new C-P Class PO-8 unit as well as on the entire line of C-P streamlined two-stage air-cooled portable compressors may be secured by those interested direct from the manufacturer by mentioning this item.

New Amsco Div. President

W. M. Black has been elected President of the American Manganese Steel Division of the American Brake Shoe & Foundry Co. Mr. Black, who has been with the company since 1912 and General Sales Manager of this Division since 1934, succeeds W. E. Crocombe who remains as President of the American Forge Division.

The American Manganese Steel Division has six plants throughout the country, the largest of which is at Chicago Heights, Ill., and manufactures a wide range of manganese steel castings, material handling pumps, special alloys and welding rods.

New 1½-2½-Ton Truck

The addition of the Model 16, with a nominal rating of 1½ to 2½ tons and a gross rating of 13,000 pounds, to the line of Federal trucks has recently been announced by the Federal Motor Truck Co., Detroit, Mich.

The Model 16 is powered by a Hercules heavy-duty 6-cylinder L-head engine with a 3 13/32 x 4¼-inch bore and stroke, developing 75 hp at 3,000 rpm. A heavy 2½-inch diameter crankshaft with Tocco electrically hardened bearing surfaces is supported by seven large main bearings. Other features of the engine include three-point rubber mounting, light-weight aluminum pistons, valve seat inserts, vacuum-type crankcase ventilator, full-length water jackets and gear-driven water pump. Completing the unit power plant is a Borg & Beck 10-inch single dry plate clutch and a four-speed transmission.

This new truck has Timken axles, the rear being of the full-floating bevel gear type. All spring and chassis pins float in compressed rubber bushings and no lubrication is ever required at these points, according to the manufacturer. Lockheed hydraulic brakes 14 inches in diameter x 2 inches wide in the front and 16 inches x 3 inches in the rear operate in cast alloy iron brake drums. Six wheelbase lengths, of 135, 146, 155, 167, 180 and 194 inches, are available.

Asphalt Specifications

Construction Series No. 53, "Specifications for Emulsified Asphalts," as adopted by The Asphalt Institute, September 11, 1940, is now available. These are new and the first issued by the Institute. Copies of these specifications, as well as Construction Series No. 51, "Revised Specifications for Cut-Back Asphalts," and Construction Series No. 52, "Revised Specifications for Slow-Curing Liquid Asphaltic Road Materials," may be obtained without charge direct from The Asphalt Institute, 801 Second Avenue, New York City, by mentioning this magazine.

CUMMER
ASPHALT
PLANTS

Portable Combination Hot and Cold Mix Plants
Portable Hot Mix Plants
Stationary Combination Hot and Cold Mix Plants
Cummer Combination Dryer-Coolers.
Steam Jacketed Mixers 400 to 8000 pounds capacity.
Cummer Internal Fire Dryers
Electric Batch Timers

THE F. D. CUMMER & SON CO.
Euclid and 17th, Cleveland, Ohio

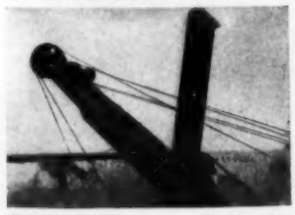
TRUCKS STAND UP!

... Hauling Mountains of Oklahoma Chat

BUCYRUS-ERIE SHOVEL loading one of Cardin's International Trucks. Shovels and trucks lubricated 100% with TEXACO, including *Texaco Crater* on open gears and wire rope.

TEXACO THUBAN for truck transmissions and differentials—assures easy gear shifting in winter weather, reduces drag.

TEXACO MARFAK is adhesive and cohesive, clings to metal, seals itself in while dirt, grit, and wheel splash are sealed out.



TEXACO CRATER penetrates wire rope, protecting each strand against wear and weather . . . on open gears, reduces friction, prevents corrosion.

HAULING mountains of heavy ore over hot, dusty, unpaved roads in its fleet of International Trucks, this Oklahoma fleet operator has lengthened engine, chassis, and wheel bearing life, stepped up mileage between lubrications.

For 5 years, Cardin Mining and Milling Company trucks, shovels, and equipment in 3 mills have been lubricated with TEXACO.

Texaco 303 Motor Oil keeps engines clean and rings free, assuring piston seal and full power.

Texaco Marfak protects wheel bearings and chassis parts against wear twice as long as ordinary grease.

Texaco Thuban provides efficient lubrication for transmissions and differentials under the heaviest loads.

Texaco engineers will gladly cooperate in showing how you, too, can make savings with Texaco truck lubricants. Phone the nearest of more than 2300 Texaco warehousing points in the 48 States, or write:

The Texas Company, 135 E. 42nd St., New York, N. Y.

TEXACO DEALERS INVITE YOU TO ENJOY

FRED ALLEN in a full-hour program every Wednesday night. CBS, 9:00 E.S.T., 8:00 C.S.T., 10:00 M.S.T., 9:00 P.S.T.

METROPOLITAN OPERA every Saturday afternoon, NBC. See local newspaper for time and station.

TEXACO Fuels and Lubricants

State-Owned Trucks Clear State Roads

Connecticut Uses Trucks Of All Divisions of the State Highway Dept. for Snow Plowing and Sanding

(*Photos on page 40*)

✦ TO maintain its 2,825 miles of state highways free of the hazards of snow and ice in the long New England winters, the Maintenance Bureau of the Connecticut State Highway Department has full use of the 363 trucks of 1½-ton and larger capacity belonging to all divisions of the Department. These include 54 4 to 7-ton all-wheel-drive units, 239 5 to 5½-ton two-wheel-drive trucks, 67 3 to 4-ton two-wheel-drive units, and 3 1½ to 2½-ton trucks with two-wheel drive. Of the 54 trucks of the all-wheel-drive type all but two are equipped with V-plows and five have wings. All of the remainder of the trucks are equipped with front blade plows.

Even though the state capital, Hartford, is located close to the center of the state with highways radiating in all directions, the snow-plow equipment cannot be centrally located because of the constant heavy industrial traffic in all directions which requires immediate removal of the snow during a storm. The state is divided into eleven maintenance districts with the snow-removal and ice-control equipment stored in eighty-five separate buildings owned or leased by the state and scattered rather uniformly over its 4,820 square miles.

All equipment used in this work is state-owned although during the winter of 1939-40 three shovels were hired for a few days and equipped with special snow scoops to handle the removal of 20-foot drifts in the northwestern section of the state. The trucks, all of which are equipped with state-owned plows, belong not only to the Maintenance Bureau but to the Roadside Development, Right-of-Way, Bridge, Sign, and Town Aid Divisions. Thus every truck in the state highway department, with the exception of the very light delivery and stake-body trucks, is available for this important winter service.

Snow Plowing

In the late summer and during the autumn, all snow-plow equipment is carefully inspected to be sure that it is in the best of condition to face whatever rigorous service it may be called upon to render battling dry and wet snows or sleet storms. The frames for handling the plows are mounted on the various trucks so that when the first storm comes it is only a matter of minutes to attach the plows ready for service. During the winter of 1939-40 the plows were pulled out 23 times to remove the average of 41.5 inches of snow which fell during the winter in the state and which reached a depth of about 53 inches in the northwest section.

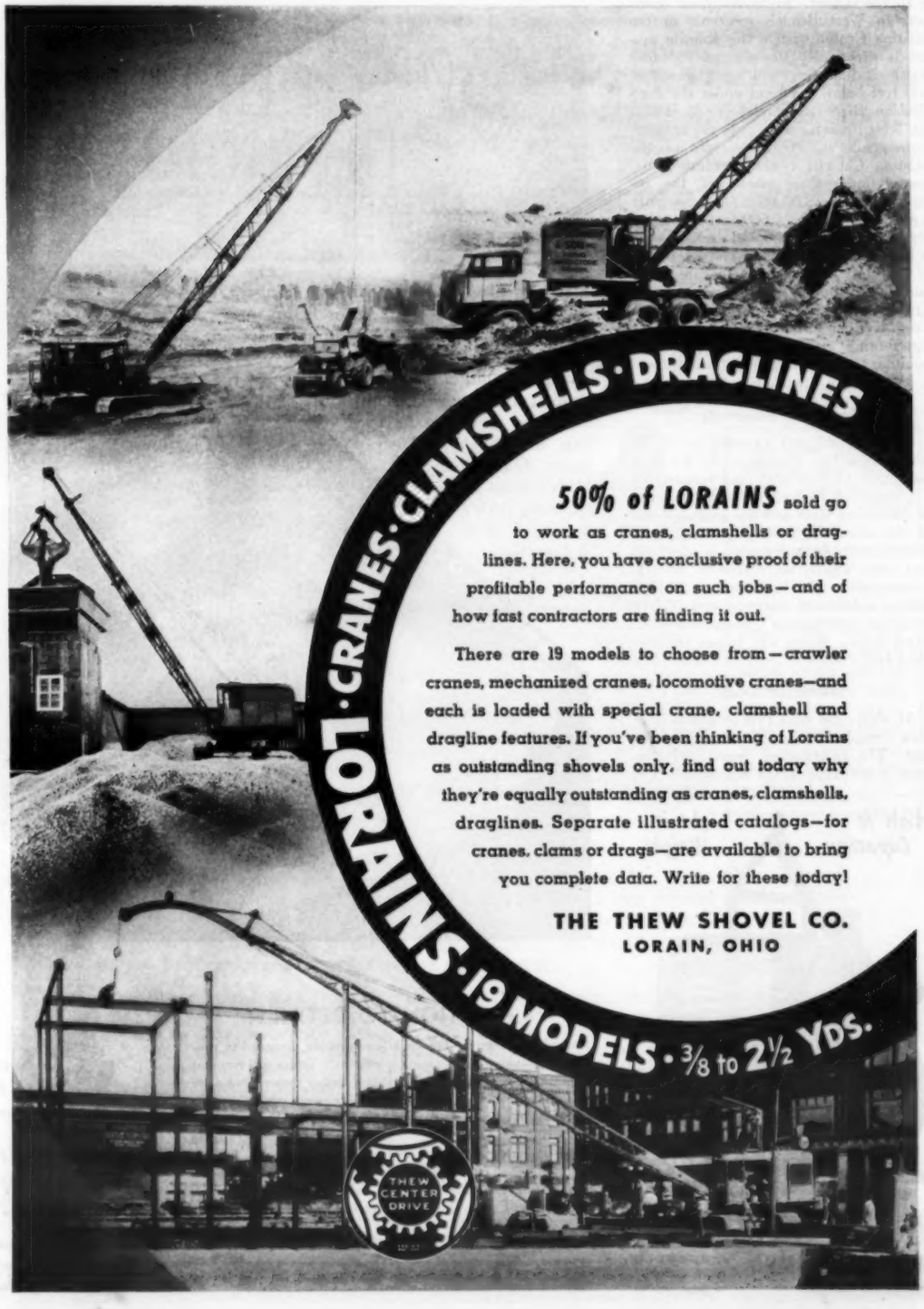
As soon as 2 inches of snow has fallen, the equipment is started out from its storage garages throughout the area of the storm. The trucks with the front blade plows operate at a maximum speed of from 12 to 15 miles per hour during plowing. Of first importance is the removal of snow from the traveled way so that the heavy truck traffic which uses practically all of Connecticut state highways may pass freely. Then during the latter part of the storm and immediately after, the snow is pushed back the full width of the shoulders, particularly during early winter. This not only leaves a place for disabled motor vehicles to pull off the traveled way but also provides storage space for later snow plowed from the highways if storms are of such frequency that the earlier snow has not melted. The route assigned to each truck for plowing varies greatly with the location and width of the road. The average 2-lane assignment is about 10 miles in length.

Of particular interest is the work of snow removal on the Merritt Parkway where a rounded curb at each side of the one-way roads separated by the boulevard strip is likely to be obscured by

(*Concluded on page 19*)

Conn. State Hwy. Dept. Photo

A four-wheel-drive truck with Frink snow plow breaking a second lane through a drift on Route 4 between Goshen and Torrington, Conn. The snow was thrown into the open lane because it could not be plowed against the steep bank on the far side.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There are 19 models to choose from—crawler cranes, mechanized cranes, locomotive cranes—and each is loaded with special crane, clamshell and dragline features. If you've been thinking of Lorains as outstanding shovels only, find out today why they're equally outstanding as cranes, clamshells, draglines. Separate illustrated catalogs—for cranes, clams or drags—are available to bring you complete data. Write for these today!
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19 MODELS · 3/8 to 2½ YDS.
THEW CENTER DRIVE

Complete Line
of
DERRICKS
and
WINCHES

SAUGEN DERRICK CO.
3101 W. Grand Ave. Chicago, Ill.

Delaware Aqueduct

(*Continued from page* 1)

reservoir, which will supply 100 mgd, are scheduled for completion in 1945. Preliminary construction for the second reservoir, Neversink reservoir, has begun. The third reservoir, the East Delaware, with its connecting tunnel will follow as the needs of the city require.

The work now under construction consists of highways at Neversink reservoir, Merriman dam with accessory structures at Lackawack, N. Y., forming the Rondout reservoir, and the aqueduct, an 85-mile pressure tunnel in rock from 300 to 1,000 feet below the general surface of the ground, concrete lined throughout. This tunnel is being driven and lined from 31 shafts 314 to 1,551 feet deep at 26 locations, 5 locations having double shafts to bring water to surface gate-houses for routing through reservoirs or purification works and to return it to the tunnel. From Rondout reservoir to West Branch reservoir of the existing Croton system the 45-mile tunnel is practically straight, of 13.5-foot finished diameter, and goes down to 600 feet below sea level under the deep Hudson River preglacial gorge. From the West Branch reservoir to the Kensico (emergency reserve) reservoir of the existing Catskill system, including bypasses under these reservoirs, the 26-mile tunnel is 15.0 feet in diameter with a maximum depth of 660 feet below sea level under the faulted and decayed rock below Kensico reservoir. The alignment of this part is irregular to locate shafts on City property and near existing Croton reservoirs which can be tapped. From Kensico reservoir to the Hill View distributing reservoir at the northern boundary of the city, the 14-mile tunnel is 19.5 feet in diameter.

Neversink Reservoir

Contract 367 was awarded to D. W. Winkelman Co., Syracuse, N. Y., at a bid price of $457,895 and consists of 4½ miles of highways around the site of Neversink dam and the southern end of the reservoir, including one 3-span steel-beam-and-concrete-slab bridge 160 feet long, wholly supported on steel H bearing piles. The highways are of both 20-foot reinforced concrete and 18-foot 3-course penetration bituminous-macadam types. Work was begun October 16, 1940.

Merriman Dam

At Merriman dam two contracts have been completed and three are in progress. The outstanding feature of this dam is the foundation condition. The deeper part of the valley is underlaid with 180 feet of heterogeneous glacial and water-borne material, sand, gravel boulders, till, clay and silt, more or less water-bearing and with artesian flow from near the surface of the underlying sandstone rock. This condition necessitated building a continuous concrete cut-off through this water-bearing material and into the sound rock, for 920 feet through the deepest part of which the caisson method was adopted. The balance of the cut-off, which has a total length including caissons of 2,788 feet, is being built in sheeted trench or open cut. The construction contracts are as follows:

Contract 338. Triest Construction Co., Inc., New York City. Contract completed. Final cost, $580,559.37. Sinking two 15 x 38-foot reinforced-concrete exploratory caissons 180 feet high from the bottom of a 17-foot trench through approximately 170 feet of heterogeneous and more or less water-bearing overburden, excavating fissured and water-bearing surface rock, sealing the caissons to rock and installing pumps and collecting systems. These two caissons, which will form parts of the finished cut-off, were sunk for the exploration of the ground, to prove the practicability of the caisson method of cut-off construction under local conditions, and for the installation of pumps to lower the ground water before the construction of the remaining caissons. The ground water was lowered during the sinking of the exploratory caissons by pumping from the caissons and a deep well sunk under the contract. The caissons were sunk for nearly two-thirds of their depth without compressed air. The maximum air pressure used was 33 pounds per square inch.

Contract 339. B. Perini & Sons, Inc., Framingham, Mass. Contract completed. Approximate cost, $2,820,000. Driving and lining 30-foot diameter stream-diversion tunnel, 2,450 feet long in Ashokan sandstone, excavating and lining inlet and outlet channels, and building cofferdam of 50 feet maximum height of rock-faced rolled-earth embankment to divert Rondout Creek into the tunnel and protect the site of the dam. The tunnel, excavated to a diameter of about 34 feet, was advanced with a 14-foot top heading and a short bench about 20 feet high, drilling the bench from a timber jumbo mounted on an auto truck. A Lorain 75-B electric-powered shovel loaded the muck into 5 and 10-cubic yard diesel-powered auto trucks. Only 65 linear feet, less than 3 per cent, of the tunnel required steel roof support. A paver-type mixer in the tunnel, supplied by trucks, delivered concrete directly to a No. 200 Rex Pumpcrete machine which placed it in three lifts, invert, sidewall and arch. Open-cut construction included the following approximate quantities: 744,000 cubic yards of earth and soil excavation; 170,000 cubic yards of rock excavation; 460,000 cubic yards of earth embankment; 328,000 cubic yards of rock fill and embankment.

Contract 340. Mason & Hanger Co., Inc., Lackawack, N. Y. Bid price, $15,-

(*Continued on next page*)

Hercules Double-Duty Tailgate Hinges are the answer to the problem of fitting one tailgate hinge to all types of dump body work. Hercules Hinges are easily changed to either offset or straight type at user's option, requiring only the reversing of forging, hinge pin, and capscrew. Entire change of both hinges requires no more than 2 or 3 minutes labor for one man.

Straight hinges are often preferable for ordinary hauling and dumping purposes. Higher loads can be carried as hinges do not interfere with sideboards. Offset hinges are generally preferred when doing shovel work—dumping large chunks of material. Hercules reversible tailgate hinges are the only method of combining both types on one body. These hinges are standard on all medium duty Hercules Dump Body units.

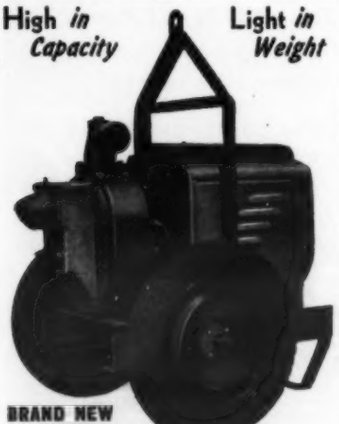
ATTENTION TO DETAILS!

Special features of Hercules equipment are designed to provide a maximum of operating efficiency under all types of conditions. The Reversible tailgate hinges shown above are but one of many exclusive Hercules features which are furnished to facilitate all-around use of Hercules Dump Bodies and Hoists. Other available features include—Tailgate lever mounted on hoist subframe, never out of reach—"Button-Ease" dash controls for hoist and power take-off, eliminating all dump levers in cab—Tire and Tool Pack compartment under body—Center-Lift Hoists.

HERCULES Center LIFT Hoist DUMP BODIES

HERCULES STEEL PRODUCTS CO. GALION, OHIO

High *in* Capacity Light *in* Weight



BRAND NEW PUMP

New 30M MARLOW Self-Priming Centrifugal Pump; 4 cylinder, 15 hp. LeRoi air-cooled engine. Superlative performance.

MARLOW PUMPS RIDGEWOOD NEW JERSEY

Delaware Aqueduct

(*Continued from preceding page*)

486,150. Construction of Merriman dam and appurtenances, including concrete cut-off wall, the effluent chamber and control works, and the excavation and lining of Shaft 1 of the Delaware Aqueduct, 980 feet deep, generally 14 feet in diameter, of 8,400 feet of aqueduct tunnel, partly 15-foot but mainly 13.5-foot finished diameter, and of 1,450 feet of 6 x 4.5-foot blow-off tunnel.

The dam, of 200 feet maximum height, 2,500 feet crest length, 60 feet top width, and 1,800 feet maximum bottom width including the loading embankments at both toes, will be of rolled-earth construction with heavy rock blankets on both slopes, the upstream slope paved, the downstream slope covered with top soil on 2 feet of earth, and grassed. The embankment material from a nearby borrow pit, with mixing, moisture content, and rolling under laboratory control, will be compacted with sheepsfoot rollers to the maximum practicable density. The dam will involve 5,600,000 cubic yards of rolled-earth embankment, 1,000,000 cubic yards of rock embankment and 1,250,000 cubic yards of other refill and embankment. Other items of the contract include 570,000 barrels of portland cement, 13,800,000 pounds of steel and iron to be furnished by the contractor and 2,000,000 pounds of metal work to be furnished by the City. As of October 30, 12 of the 18 caissons of the cut-off (there will be 20 caissons including the exploratory caissons) 45 feet long, 10 or 12 feet wide and from 76 to 169 feet high, had been sunk and sealed to rock, and the other caissons were nearing completion. By pumping from the exploratory caissons, the deep well and the caissons under this contract, 93 per cent of the excavation was done under free air and the maximum air pressure used at any time did not exceed 38 pounds. The 980-foot shaft has been sunk and lined and the headings turned. Excavation for the effluent chamber and approach channel, largely in rock, and construction of loading embankments at the toes of the dam are under way. For the protection of drill runners in open-cut work, exhaust hoods and suction dust-collecting systems are being used.

Contract 341. Ottaviano & MacDonald, Inc., and A. E. Ottaviano, Inc., Croton-On-Hudson, N. Y. Bid price, $942,660. Construction of 8¼ miles of highways at Rondout reservoir, 3-course bituminous-macadam type, penetration method, 18 and 20-foot pavement width; also a steel skew bridge over Rondout Creek having a 180-foot central truss span with a 70-foot girder span at each end, and a 3-span continuous-girder reinforced-concrete bridge without skew over Sawkill Creek with a 100-foot central span and two 70-foot end spans. This contract presented no special problem except the foundation of the east pier of Rondout Creek bridge where bedrock was overlaid with about 50 feet of water-bearing material including running ground. This foundation was made by sinking, grouting and filling with concrete six 24-inch diameter steel cylinder piles inside a steel sheet pile cofferdam. Bridges and all macadam completed; contract more than three-fourths completed.

Contract 343. Reiss & Weinsier, Inc, Brooklyn, N. Y. Bid price, $1,084,861. Construction of 11½ miles of highways at Rondout reservoir, 3-course bituminous-macadam type, penetration method, 18 and 20-foot pavement width; also three steel-beam and concrete-slab bridges, one of them with piers and abutments on steel H bearing piles. This contract is over one-third completed.

Shaft Contracts

To expedite construction of the aqueduct four contracts were let in January and March, 1937, for sinking and lining shafts on those parts of the aqueduct between Rondout and West Branch reservoirs where speed was especially important because of the great depth and wide spacing of the shafts, and between Kensico and Hill View reservoirs because of the urgency of completing a second aqueduct as a matter of safety. Each of these contracts was for the sinking and lining of the shafts, the driving of about 200 feet of tunnel each way from the bottoms of the shafts and in some cases the excavation of underground magazines. All shafts were circular or elliptical and lined with concrete as they were sunk, no timber being used. Where water was found or expected, pilot holes were carried ahead and grouted at high pressure before excavation. The shafts were excavated and lined in lengths of 6 to 100 feet, depending upon the soundness of the rock. Steel head frames were required after the shafts reached a depth of 100 feet.

Contract 332. Dravo Corp., Pittsburgh, Pa. Contract completed. Final estimate, $1,443,503.87. Shafts 2, 2A and 3, 825, 1,551 and 838 feet deep respectively, and all 14.0 feet in diameter inside the concrete lining. Rock encountered: Ashokan sandstones and shales, Shawangunk grit and Hudson River shales, slates and sandstones. Near the end of the contract, methane gas was encountered in the north heading from Shaft 2A, requiring constant testing of the air, copious exhaust ventilation, face blowers, and other precautions.

Contract 333. Frazier-Davis Construction Co., Newburgh, N. Y. Contract completed. Final estimate, $2,042,334.52. Shafts 4, 5, 5A and 6, 880, 1,010, 910 and 680 feet deep respectively. The first three are 14.0 feet in diameter, inside concrete lining. Shaft 6 is 26.5 feet in diameter. All shafts are in the Hudson River shales, slates and sandstones, generally dry. No special difficulty encountered. Noteworthy progress in shaft sinking and lining was made on this contract. From the completion of the head frames (shaft depths about 100 feet) to the completion of the last sections of lining, average progress per week of five 24-hour days was: for 14-foot shafts, Nos. 4, 5 and 5A, 27.7 feet, 28.2 feet and 31.4 feet respectively; for 26.5-foot shaft, No. 6, 15.9 feet.

Contract 334. W. E. Callahan Con-

(*Concluded on page 23*)

Guaranteed for One Year!

GRIFFIN

WELLPOINTS and PUMPS

Insist on this guarantee when next ordering dewatering equipment.

THERE'S A DIFFERENCE—INVESTIGATE

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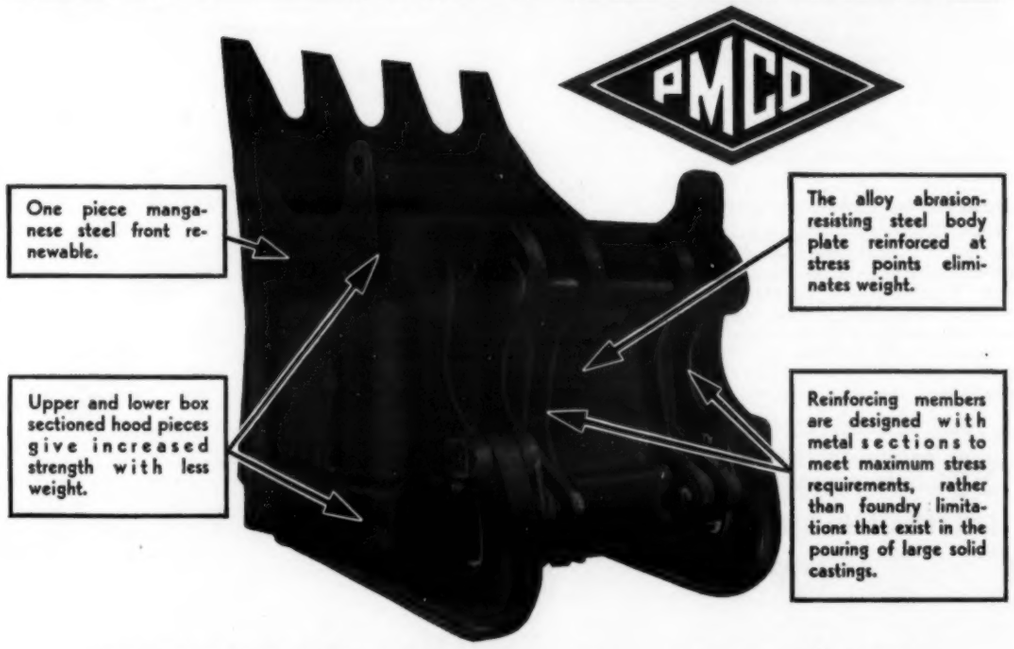
Yes, we make both SOLID MANGANESE AND WELDED DIPPERS

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES

—but here's why we recommend

THE MODERN PMCO WELDED DIPPER


PMCO
One piece manganese steel front renewable.
The alloy abrasion-resisting steel body plate reinforced at stress points eliminates weight.
Upper and lower box sectioned hood pieces give increased strength with less weight.
Reinforcing members are designed with metal sections to meet maximum stress requirements, rather than foundry limitations that exist in the pouring of large solid castings.

(1) PMCO Welded Dippers have increased capacity up to 30% through the elimination of unnecessary weight. (2) They have added strength due to the reinforced principle of construction. (3) Flexibility in design, to meet unusual conditions, is possible only in the fabricated dipper. (4) Economy in production gives greater value to the user.

A solid cast dipper has useless weight—in walls—due solely to foundry limitations. This excess weight is unnecessary for strength. The Welded PMCO Dipper, on the other hand, by being built around steel plate as a base, instead of being a solid casting, eliminates this useless weight without sacrificing strength.

The alloy abrasion-resisting body plate, the alloy steel upper and lower reinforcing hood castings, and the reinforcing rib sections are welded together to form an exceedingly strong box unit. After welding, the dipper is stress relieved to eliminate strain in the welded parts. The one-piece manganese steel front, being renewable, is riveted to the box unit.

PMCO dippers are built in all sizes. ⅜-yard to 30-yards capacity.

Some Leading Shovel Manufacturers and representative customers, who now use PMCO welded dippers:

Lima — Koehring — Oliver Iron Mining Co.
Link-Belt — Butler Brothers — Pickands Mather Co.
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Manitowoc Shipbuilding

PETTIBONE MULLIKEN CORPORATION

Established 1880

4710 West Division Street, Chicago, Illinois

The new Adams No. 311.

New Motor Grader For Year-Round Work

One of the features of the new No. 311 Adams motor grader is its balanced construction, with the distribution of weight on the rear wheels for traction, on the blade and scarifier for penetration, and on the front wheels for effective steering control. Another feature is the availability of a snow plow and wing so that this one machine may serve as a grader, maintainer, ditch cutter or bank sloper during part of the year and for the remainder join the snow-fighting equipment, thus providing year-round maintenance service.

This new Adams model is powered by a 50-hp International full-diesel engine with a convenient starting arrangement. If desired an electric starter is available, or without the starter all that is necessary is two or three quarter-turns of the engine with the hand crank at the rear of the grader. There are eight forward speeds, providing a speed range from 1.4 to 15.7 mph. Bendix self-energizing hydraulic brakes on tandem provide positive immediate brake action. The blade is fully reversible and adaptable to ditch cutting or high bank sloping, and the cab permits the operator to work standing up or sitting down.

Further information on this new No. 311 motor grader may be secured direct from the J. D. Adams Co., Indianapolis, Ind., by mentioning this magazine.

Bulletin on Concrete Carts

The Ransome Concrete Machinery Co., Dunellen, N.J., has recently issued a new bulletin describing its line of concrete carts. Entitled "Speed Up Moving of Concrete," it is attractively printed in two colors and profusely illustrated.

Copies of this Bulletin No. 163-A may be obtained by writing direct to the manufacturer and mentioning this item.

New Diesel-Electric Sets by Caterpillar

To round out its line of diesel-electric sets, two new models, the 88-41 and the 77-34, have been announced by the Caterpillar Tractor Co., Peoria, Ill. Because of the wide application of these sets, maintenance problems have been simplified by having the entire unit serviced by Caterpillar distributors.

Both of these new units are powered by 4-cylinder diesel engines. The 88-41, with a 5¾ x 8-inch bore and stroke, develops 41 kw at 900 rpm, when equipped with a radiator fan, and without the fan its kilowatt rating is 44. The 77-34 has a 5¼-inch bore and 8-inch stroke, and develops 34 kw at the same rpm with the fan, or 36 kw without the fan. Both ratings are for the polyphase 60-cycle set, and single-phase ratings are slightly lower.

The sets are completely self-controlled, easy to install, and can be set up and running in less than an hour. In-built regulation enables the sets to pick up relatively large motor loads with a minimum of light flicker and voltage drop, according to the manufacturer. They can be operated by personnel without special training, there being only three operating adjustments on the engines, none of which involve the fuel system. The generators are of the direct-connected rotating field type, available in three or single phase, 60 or 50-cycle, and with a wide variety of voltages.

A new bulletin, Form 6085, describing Caterpillar diesel engines, power units and generator sets, has recently been issued and copies may be secured direct from the manufacturer or from this magazine.

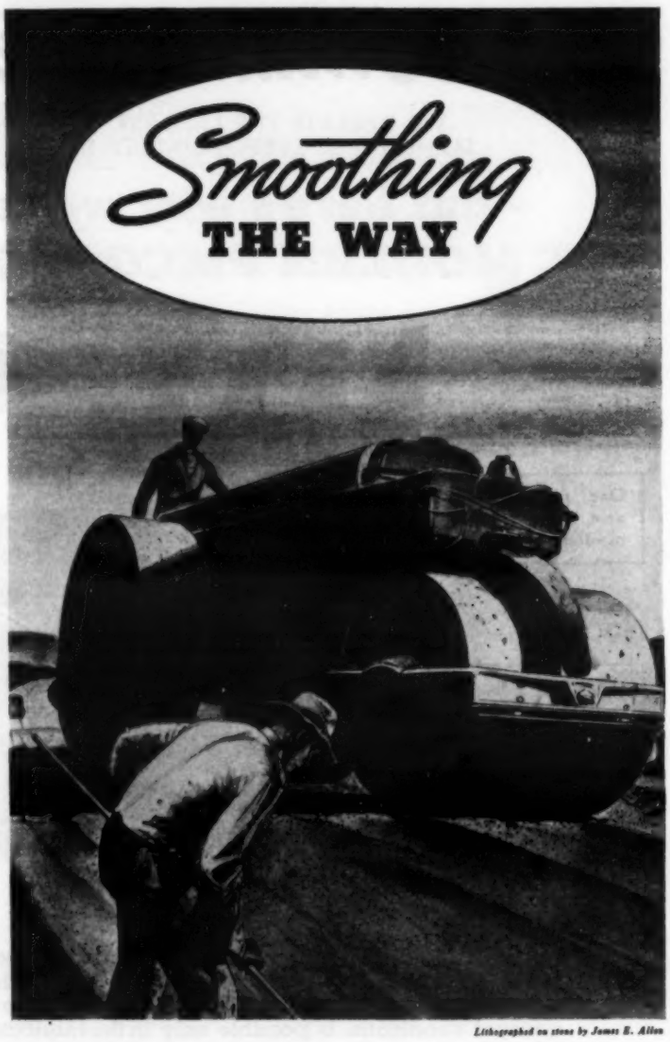
Golden Anniversary

The West Companies, Chattanooga, Tenn., announce that this year they are celebrating their Golden Anniversary—fifty years of service in the plant-mixed asphalt industry. During these fifty years of active operation, the West organizations have laid approximately 1,500 miles of plant-mix roads and streets and they look to the future as a period of ever-increasing opportunity for service in this industry, believing that their reputation for doing good work is their most valuable asset.

Hand and Power Pipe Tools

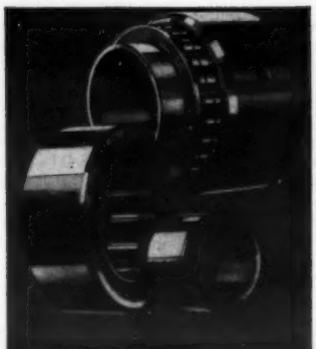
Beaver Pipe Tools, Warren, Ohio, has available two new bulletins, one given over entirely to detailed descriptions of its Models A, B and C pipe and bolt machines, with comments from satisfied users, and the other a general catalog describing other tools in the Beaver line, such as semi and fully-adjustable threaders, ratchet sets for pipe and bolts, thin-wheel pipe cutters, square-end knife pipe cutters, a combination saw-guide and vise, and others.

Copies of these bulletins which should be helpful and interesting to any one who uses, buys or specifies pipe tools may be obtained direct from the manufacturer by mentioning this item.



Lithographed on stone by James E. Allen

HYATTS ROLL MERRILY ALONG carrying heavy loads . . . eliminating bearing wear and care, keeping shafts, gears and wheels in perfect alignment . . . and making life easy, *and long,* for the equipment that builds roads and maintains them. Everywhere, Hyatt Roller Bearings are smoothing the way. Design them into the machines you build; look for them in the equipment you buy. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Pittsburgh, Detroit and San Francisco.



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ROLLER
BEARINGS

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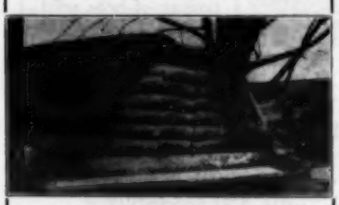
CAN YOU AFFORD A COVER?



Actual Dollars—Cold Cash is represented in each of these sacks, and so in your lumber, your bricks, your tile, your hardware. Profits quickly slide to the other side of the ledger if these materials are not safeguarded.

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Grading Contractor Has Shop On Wheels

Wm. Collins & Son Operates Several Grading Outfits Each as a Unit; Work on Grade at Clara City, Minn.

✦ A COMPLETE machine shop packed away in a solid-tired trailer featured the equipment of Wm. Collins & Son of Moorehead, Minn., grading contractor for FAP 122-3 between Raymond and Clara City, Minn. The $73,000 job was 7.6 miles long and handled completely with LeTourneau Carryalls. The balances were few and far between, requiring 1,867,337 station-yards of overhaul of material on the right-of-way, and 415,516 yard-miles of haul of borrow for the 9-inch cushion of sand and gravel over the entire length of the job. The unclassified excavation amounted to 311,218 cubic yards on which 500 feet was the required free haul.

The entire 7.6 miles was on new location through cultivated land and heavy soil. In the very first week of work the outfit had rain on alternate days, converting the grade into semi-solid grease devoid of traction when very wet and which became a sticky mess when only slightly wet. Fortunately the material dried out quickly under the hot sun and dry breezes so that by mid-forenoon of the fair days the Carryalls and other equipment were once more rolling with full loads.

All of Collins' service equipment is carried on 4-wheel trailers, including the shop, kitchen and dining room, and the office which also houses the parts storage. It was evident that they had moved into the 5-acre field, which was their home for eight weeks, in wet weather, as every wheel had sunk into the ground almost to the axle. Scattered around the field and about equi-distant from the cook wagon were the ultra-modern auto trailers occupied by the operators and their families.

During our conversation about the operation of the job, W. J. Hjerpe, Superintendent for Wm. Collins & Son on this project, remarked that in the old days there was one big grading outfit working on a 20 or 25-mile job and it was possible to ship in the necessary equipment for a full machine shop to maintain the machines during the job. At the time of our visit, Wm. Collins & Son had three outfits working at distant points on shorter jobs and each had to be equipped to make the repairs needed on even modern machines. That led to the development of the very efficient trailer machine shop seen on this job and which was duplicated, with some minor changes, on each of the other three outfits.

The Trailer Shop

The mechanic lamented that they did not have a lathe in the trailer shop but they just had to omit it because its installation would have required the omission of several other important power tools. Just how they packed all the tools they did into the shop and still had room to move around effectively was somewhat of a mystery. Tucked away in one corner behind the forge was a Novo engine which ran the jackshaft to deliver power along the side of the shop to the power grindstone, trip hammer and drill press. Then along the walls were small bins for the tools, bolts and nuts and other inexpensive parts that are the essentials of any machine shop used for the repair of equipment.

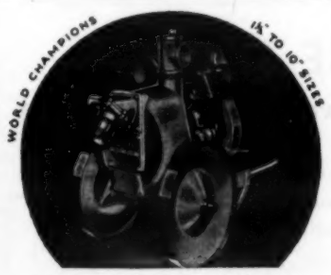
C. & E. M. Photo

Ditch slopes cut by a 12-yard Carryall and RD8 in clay.

The Other Service Trailers

Of great importance to the operation of the equipment was the gas tank trailer with a 500-gallon tank mounted on it, a spigot at the bottom for filling cans, and a double-acting hand pump at the top for delivering gas to equipment higher than the tank. Mounted on the sides were drums of oil and grease for quick handling.

(Concluded on page 29)



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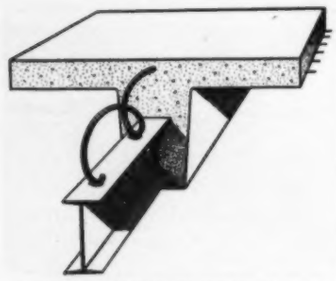

A section of the Alpha system of steel and concrete construction developed for use in bridges and overpasses.

Composite Material Reduces Dead Weight

One of the problems of bridge reconstruction and modernization, which must be met by state and county engineers if the hundreds of obsolete bridges in this country are to be made suitable for military as well as present-day traffic, is that of increasing the strength of the structure without increasing its dead weight.

An example of one solution of this problem occurred on several recent bridge construction jobs in Dutchess County, New York. It was found that the deflection of the required sections for standard steel construction was too great, and heavier sections were necessary to bring it down to the required 1/1,000 of the span. However, the heavier sections would greatly increase the dead weight. To solve this problem, Alpha composite construction, a system of steel and concrete construction, was used for the structural members, reducing the deflection by 40 to 46 per cent, according to the Porete Mfg. Co., which developed this system.

This composite construction consists of a structural steel section, a reinforced concrete slab, and a spiral arc-welded to the steel section and embedded in the concrete slab, thus combining three elements into one structural unit. The steel section bound solidly by the spiral to the concrete slab takes the tensile stresses, the spiral transmits all of the horizontal shear, and the concrete slab takes all or most of the compressive stresses, as in reinforced concrete construction. Numerous tests have shown that the spiral is a reliable and effective means for transmitting all of the horizontal shear from the steel section into the concrete slab.

Interested state and county highway engineers may secure further information on this new type of composite construction for highway bridges direct from the Porete Mfg. Co., Porete Ave., North Arlington, N. J., by mentioning this item.

New Jaw Crushers

Two new jaw crushers, in 20 x 36 and 24 x 36 sizes, have recently been announced by the Diamond Iron Works, Inc., Minneapolis, Minn. The long jaw design and contour of the breaker plates of these crushers assure more positive grip and crushing effect on the upper or feed end of the jaws, and the long jaws produce a more uniform product by preventing larger stone and slabs from passing before reduction, according to the manufacturer.

The main frame is all welded from heavy steel plate, annealed for stress relief and accurately machined. The heavy-duty eccentric pitman shafts have oversize dimensions, and journal and pitman bearings are all special-purpose heavy-duty roller types. The pitman is of heavily ribbed steel castings, annealed and accurately machined for bearings, toggle seat and manganese jaw, while the jaws, cheek plates and pitman toggle seat are of manganese steel castings.

Product-size adjustments are made by a reversible hand-lever ratchet raising or lowering the adjusting wedge against the rear toggle seat. The cast iron toggle has chilled bearing edges and is designed to break if large pieces of tramp iron or other uncrushable materials jam the jaws, thus protecting the expensive parts of the crusher. Lubrication is by Alemite high-pressure fittings to each individual bearing which is sealed against dirt and abrasive grit. All bearings are equipped with flush and drain openings for cleaning old grease from bearings when advisable.

New Live-Hose Reel

The new type of live-hose reel recently developed for use on Schramm portable or stationary air compressors is designed so that 3 feet or the entire 50 feet of hose can be pulled from the reel and the valve then opened, allowing air or water to enter the hose. Other features of this new reel are its easy mounting, as it fits any 1½-inch female pipe thread; built-in valve construction inside the reel and made from standard valve parts; extra-strength side members spun and welded to the hub; heavy bronze bushings to support the reel; and free turning under all conditions. The valve is self sealing, with no adjustments, packing or stuffing boxes.

This reel can be obtained in two styles: one has flat sides for wall mounting or for concave air tanks; the other has one flat side and one concave side to fit over convex-end air tanks. Several capacities are available for air, water or gases.

Further information on these new Schramm live-hose reels may be secured direct from Schramm, Inc., West Chester, Penna., by mentioning this item, or from this magazine.

Earth Moving Tools And Tractor Equipment

The Heil Co., Milwaukee, Wis., manufacturer of hydraulic, cable and bottomless scoops, trailbuilders, bulldozers, tamping rollers, snow plows, and dump units, has recently issued a folder depicting its equipment at work on various construction jobs throughout the country. These interesting photographs show Heil equipment doing jobs ranging from keeping the Hialeah Race Track at Hollywood, Florida, in condition to moving rock and shale for the Pennsylvania Turnpike.

Copies of this Bulletin No. RM 525 may be obtained by those interested direct from the manufacturer.

ALEMITE PORTABLE SERVICE STATION

Pays for itself quickly, says North Carolina Contractor

TOYLE NASH, who is lubrication engineer for Morrison Knudsen Company, Inc., at Sylva, North Carolina, says their Alemite Portable Service Station *cuts lubrication time in half!* They used to spend three hours a day lubricating their various machines on the job. Now the job is done in an hour and a half.

The rig shown in the photograph is charged at $12 per hour. Call that a fair average for their other cats, scrapers, shovels, and trucks. The saving effected by Alemite Power Lubrication on the job is *not less than $18 a day.* At that rate the Alemite equipment will be paid for long before this job is finished!

Tell us what machines you'd like to lubricate on your next big job, and let us plan an Alemite Portable Service Station *for your particular needs.* It's amazing how much time can be saved by having Alemite High Pressure and Low Pressure Guns and Alemite Motor Oil Dispensers *always ready on the job*—with an ample supply of air for all needs, too! *Get the facts now!*

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Roadside Planting

(*Continued from page 2*)

fill and cut sections and stockpiled the soil along the toe of the slope or on top of the backslope. The depth of top soil, which was stripped by scrapers and bulldozers, varied from 4 to 6 inches, and the soil was stripped from the entire width of the section from back of slope to back of slope.

After the road bed was finished to grade and the slopes dressed, the top soil was re-spread on the slopes to a depth of 2 to 6 inches, depending on the amount available. Both scrapers and teams were used for this work. The Superintendent minimized the danger of rains washing the top soil from the slopes by keeping the sodding crew following closely after the placing of the top soil. However, because of the flat slopes on this project, very little washing occurred on those sections which received heavy rains before the sod could be placed.

With the exception of two backslopes, all sod was trench or strip sodding with the rows on 18-inch centers. On several sections of the road, the top soil contained so much natural grass that no sodding was necessary when the top soil was re-spread on the slopes.

Personnel

Oran Speer of Alvord, Texas, a member of the A. G. C., was contractor for this 9.589-mile project extending east from Tyler, Texas. The bid price was $117,971.22. The late James Spencer, Superintendent for Speer on this job, was nominated for one of the 1939 Roadside Development Awards because of his efficient handling of this work and his cooperation in carrying on its experimental phases.

On this project the handling of top soil was paid for at the same unit price bid for common road excavation. The efficient methods of handling this work resulted in its adding very little to the cost of the project, and will undoubtedly have a great influence in making this work of salvaging top soil a regular part of Unit I construction on future highway projects.

H. E. Dew was Senior Resident Engineer for the Texas Highway Department on this job, and Jac L. Gubbels is Head of Roadside Development for the Department.

A Texas roadside sodded with Bermuda grass, six weeks after placing the sod.

New ½-Inch Drill

Described by its manufacturer as "the greatest buy in drill history," the new Model 80 drill recently announced by Skilsaw, Inc., 4769 Winnemac Ave., Chicago, Ill., has a number of features of compactness and light weight, as well as being said to have 100 per cent anti-friction bearing construction.

This Model 80 weighs only 8 pounds, is 11½ inches long overall and 9¼ inches high. Its compact construction makes it particularly adaptable for use in tight places. The die-cast body combines strength and light weight, every moving shaft is mounted on friction-free ball or needle roller bearings, and the two-pole safety switch has 100 per cent overload capacity.

Power is furnished by a Universal electric motor, providing a no-load speed of 450 rpm and a full-load speed of 300 rpm. The Model 80's drilling capacity in steel is ½ inch and in hard wood 1¼ inches.

Three More States Vote To Protect Highway Funds

Voters in Idaho, Nevada and South Dakota have joined the enlightened citizenry of eight other states and ratified constitutional amendments protecting highway funds at the election in November. Returns from Idaho show that the amendment was carried by a majority of three to one, while a similar amendment in Nevada was given a vote of nearly four to one. In South Dakota the so-called "better and safer roads amendment" likewise passed by a substantial margin and was the only amendment on the ballot that was passed.

These three states join California, Colorado, Kansas, Michigan, Minnesota, Missouri, New Hampshire and North Dakota in protecting the funds collected from the public for highway purposes from being diverted to non-highway use.

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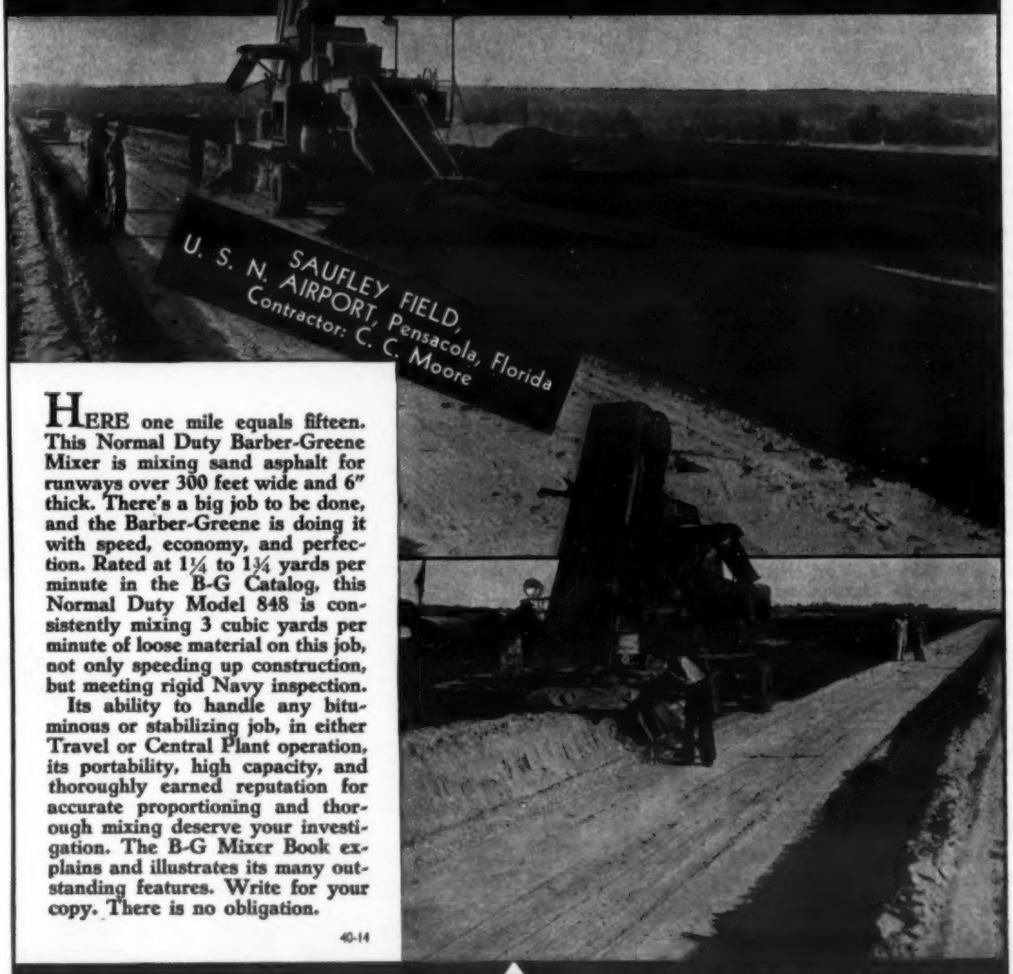


HERE one mile equals fifteen. This Normal Duty Barber-Greene Mixer is mixing sand asphalt for runways over 300 feet wide and 6" thick. There's a big job to be done, and the Barber-Greene is doing it with speed, economy, and perfection. Rated at 1¼ to 1¾ yards per minute in the B-G Catalog, this Normal Duty Model 848 is consistently mixing 3 cubic yards per minute of loose material on this job, not only speeding up construction, but meeting rigid Navy inspection.

Its ability to handle any bituminous or stabilizing job, in either Travel or Central Plant operation, its portability, high capacity, and thoroughly earned reputation for accurate proportioning and thorough mixing deserve your investigation. The B-G Mixer Book explains and illustrates its many outstanding features. Write for your copy. There is no obligation.

40-14

BARBER GREENE
AURORA ILLINOIS

Tunnels Call for New Methods, Equipment

(*Continued from page 1*)

monoxide and smoke. Heavy steel head frames are used throughout with high-speed hoists, large-capacity muck hoppers, and truck removal of muck. In most cases muck is hoisted by skips of 5 to 12-yard capacity, self dumping into the hoppers. All drills are of the New York pattern, designed to minimize dust, and a separate 100 to 150-hp blower of 10,000 to 14,000 cfm capacity ventilates each heading through a 26 to 30-inch vent pipe throughout the excavation period. With the abundant use of water, these precautions keep the dust during tunnel excavation below 10,000,000 particles per cubic foot and afford complete protection from the silicosis hazard. All contractors are making three or more advances of about 8.5 to 10.5 feet per day, and as many as six advances per day have been made.

For support of the roof, prior to concreting, steel is used throughout for ribs, usually curved, and for wall plates and lagging. A minimum of timber is used for posts and blocking and all possible timber and lagging are removed before concreting. Gunite coating of the roof and walls to prevent spalling on exposure of the rock to air has been extensively and successfully used. Typical sustained speeds of tunnel excavation for a 6-day week, after the first 1,000 feet or so for perfecting organization, including all delays due to water, grouting and bad ground, are 200 feet for 13.5-foot tunnel, excavated to about 17.5 foot diameter; 140 feet for 15-foot tunnel, with about 19 feet diameter of excavation, and 125 feet for 19.5-foot tunnel, excavated to about 23.5 foot diameter.

About 2,650,000 cubic yards of concrete, or approximately 82 per cent of the amount in Boulder Dam, will be required for the lining of the Aqueduct. The lining averages about 24 inches thick. Contractors have had to devise new and revise old methods of mixing, transporting and placing concrete. The difficulty in getting concrete from the surface into the tunnel and from the point of entry to the forms anywhere from 1 to 5 miles distant has presented a new and out-of-the-ordinary material-handling problem.

Where concrete lining is under way, typical procedure is as follows: first a concrete curb wall is built on clean rock on a hand-mucked bottom on each side of the invert. The curb walls support the radial invert side forms, set accurately to line and grade, which guide the invert screed, and also rails for the various types of traveling bridges. These bridges carry cars dumping concrete into the invert, and other concreting equipment. The bottom between the curb walls is mucked by dragline, bulldozer, mucking machine or a combination of these machines, with the final cleaning by hand or by high-pressure air-and-water blasts. On some contracts, concrete is mixed above ground, dropped through an 8 or 10-inch steel pipe to a hopper at the bottom of the shaft and transported to the work in agitator cars. On other contracts the dry batch is dropped through pipes, aggregate and cement separately, to hoppers at the shaft bottoms, loaded into batch cars, aggregate and cement still separate, and mixed in a portable mixing and concrete pump plant running on track laid on finished invert. Final placing of the concrete is by pump or gun, except that on some contracts invert concrete is dumped directly from agitator cars running on the bridge which travels on the curb walls, or by belt conveyor from the mixer. On some contracts the sidewall and arch pour is in fixed lengths of 150 feet or more between end bulkheads; on other contracts concreting is continuous throughout the 5-day week, forms from the rear end of the work being collapsed in short lengths and brought forward to the head end of the work as the concrete advances.

Tunnel Contracts

Contract 313. Samuel R. Rosoff, Ltd., Kerhonkson, N. Y. Bid price, $18,916,650. 14.2 miles of 13.5-foot tunnel (diameter of excavation about 17.5 feet) being driven from three shafts: 2, 2A and 3. Rock: shales and sandstones of the Ashokan series and of the Hudson River series separated by something over a mile of eleven other formations, sandstones, shales, limestones and Shawangunk grit. Occasional occurrence of methane in the carbonaceous shale necessitates continuous exhaust ventilation of about 10,000 cfm from each heading, testing the air after every shot, use of "permissible" equipment and other precautions. Heading 2 South is now facing about 200 feet of badly broken and extremely wet ground. This ground has been explored by means of core borings drilled from the tunnel and consolidated by the injection of cement grout. Excavation will proceed after the completion of a massive safety bulkhead to protect the tunnel from flooding in case of sudden inflow. Completed excavation exceeds 11 miles; 91 per cent supported.

Contract 316. Walsh Construction Co., Davenport, Iowa. Bid price, $11,111,111.11. 9 miles of 13.5-foot tunnel driven from Shafts 4 and 5 in Hudson River sandstones and shales, generally dry and sound, only 2 per cent requiring support. One heading, 5 South, was delayed about two months by the construction of a bulkhead and grouting off water. Shaft 4 will contain two 72-inch risers terminating in a large underground valve chamber at the shaft head for connection to the Catskill aqueduct. This contract holds all records on the Delaware Aqueduct for speed of tunnel driving, including the following rates of progress, working 3 shifts, 6 days per week: best 18 consecutive weeks, average of 4 headings, 284.5 feet per heading per week; best 4 consecutive weeks, average of 4 headings, 320 feet per heading per week; best 4 consecutive weeks, best heading, 400 feet per heading per week; maximum week, 1 heading, 408 feet; maximum day, 1 heading, 78 feet; 31 consecutive working days, 1 heading, 2,019 feet. Excavation completed; lining begun.

(*Continued on next page*)

GOVERNMENT ENGINEERS USE

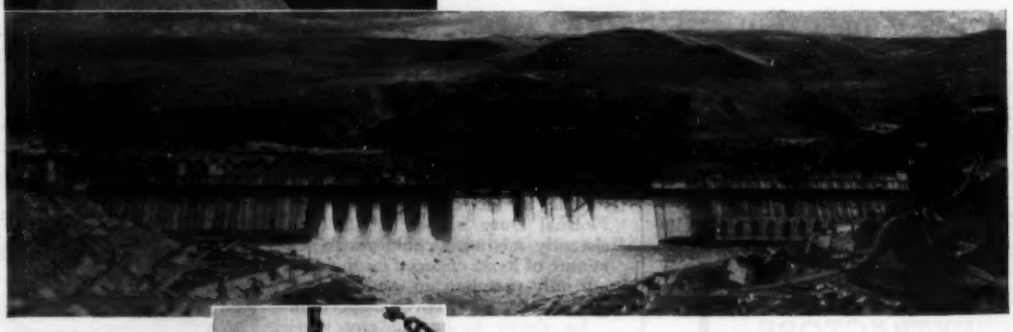
CALCIUM CHLORIDE

to speed up construction in cold weather concreting

IN all National Defense projects and for general construction, concreting must proceed without interruption throughout the winter months. Accelerated hardening and high early strength are essential to successful cold-weather construction.

Government agencies, architects and contractors know that these properties can be imparted to concrete by specifying and using calcium chloride. For they have found it a valuable ally for more than twenty years.

No other method so economically produces high early strength concrete either with standard Portland or High Early Strength Cements. In addition, calcium chloride gives a more workable mix, permits earlier finishing and removal of forms, and gives substantial cold-weather protection by increasing the rate of hardening.



Among many major government projects in which hundreds of tons of calcium chloride have been used are the Grand Coulee and Bartlett Dams. Top and bottom photos taken at Bartlett, center photo at Grand Coulee, by the U.S. Bureau of Reclamation and reproduced through its courtesy.

These advantages, apparent in field practice, are fully substantiated by exhaustive test work of the National Bureau of Standards and other impartial authorities in national, state and industrial work.

And with calcium chloride you get speed with safety for the concrete is stronger at all ages, gains safe strength in half the time and, best of all, gives concrete placed at 40° the normal fast setting time of concrete placed at 70°.

If speed is essential in your concreting, always include calcium chloride. Data and specifications are available for the asking.

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Many Miles of Tunnel In Delaware Aqueduct

(*Continued from preceding page*)

Contract 318. Pleasantville Constructors, Inc., Chelsea, N. Y. Bid price, $10,679,710. 6.8 miles of 13.5-foot tunnel driven from Shafts 5A and 6, together with riser and underground valve chamber at Shaft 5A and drainage and access equipment and superstructure at the drainage shaft, Shaft 6. Rock: Hudson River shales and sandstones, generally dry, except about 1.3 miles of Wappinger limestone, in part faulted and decayed. In this limestone, Heading 6 North struck heavy flows of water with disintegrated rock. After construction of a massive safety bulkhead, pilot headings were driven on each side of the bottom of the tunnel through 214 feet of the worst ground. After installing drains, concrete walls on which to erect steel roof support were built in these drifts, after which full face excavation and erection of steel support was possible. The excavation through 1,106 linear feet of this weak and decayed ground has been enlarged and this section is being lined with heavily reinforced concrete surrounding a watertight 1-inch steel plate interlining with an inner concrete lining. Two hundred feet of similar lining will be placed across a dry crushed zone in Heading 5A South. All tunnel excavation completed, 4.4 per cent requiring support; lining begun.

Contract 319. Dravo Corp., Pittsburgh, Pa. Bid price, $11,431,975. 10.4 miles of 13.5-foot tunnel driven from Shafts 7 and 8, mainly in Highlands gneisses and granites, much broken, generally wet, and requiring frequent grouting. Rock frequently under strain; nearly 50 per cent required support. 6.6 miles excavated.

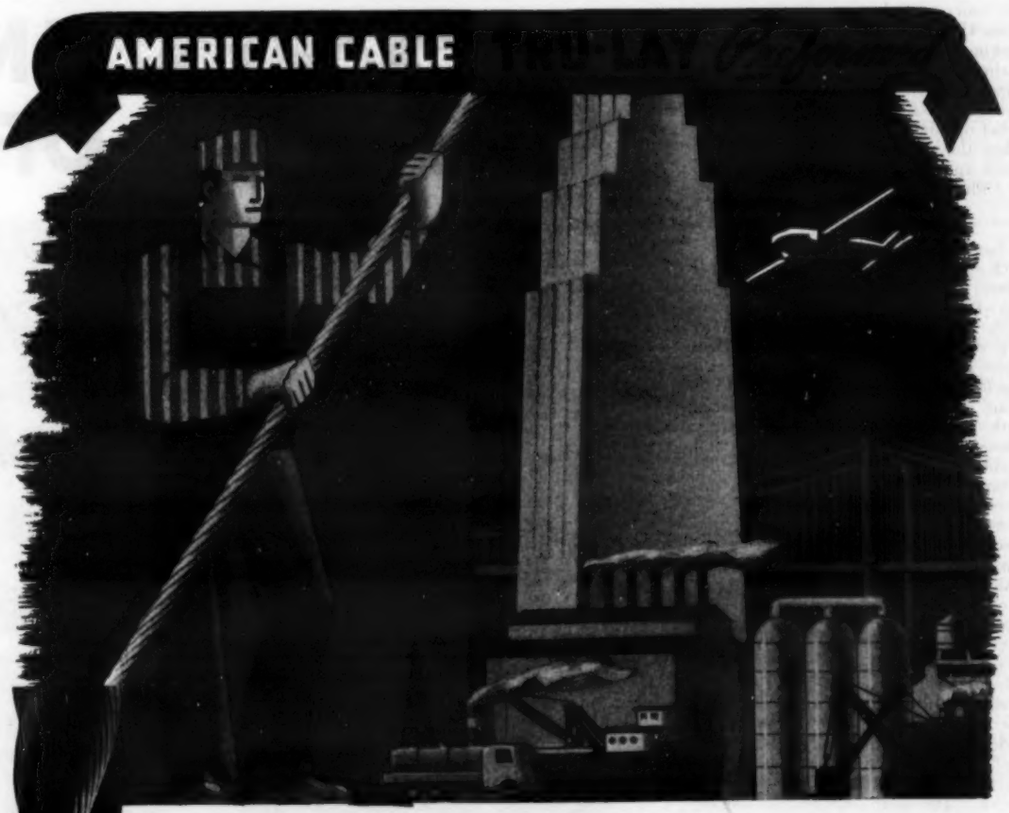
Contract 321. Frazier-Davis Construction Co., St. Louis, Mo. Bid price, $11,924,450. 6.5 miles of 13.5 and 15.0-foot tunnel, driven from Shafts 9 and 10. Rock: Highlands gneisses and granites, generally excellent except for some strained and "popping" rock; less than 5 per cent requiring support. The double shafts at 9 and 10 will be surmounted by gate houses and control works. Both gate houses will have granite-trimmed brick superstructures and will connect with, and require construction in, West Branch reservoir behind cellular steel sheet pile cofferdams. 6.1 miles of tunnel excavated; lining begun.

Contract 322. The Utah Construction Co., Croton Falls, N. Y. Bid price, $10,829,530. Excavation and lining of Shafts 11 and 12, 313 and 359 feet deep respectively, 16 to 22 feet in diameter and 14 feet in diameter inside the lining, and 6.4 miles of 15-foot tunnel. Shaft 11, about 590 feet off the tunnel line with which it is connected by a 12-foot diameter drift, will contain two 72-inch risers and will be surmounted by an underground valve chamber and foundations for a future pumping station. Shaft 12 is for construction only and will be sealed. Rock: Highlands gneisses, granites and schists followed by a complex and much folded arrangement of Fordham gneiss, Inwood limestone and Manhattan schist; 34 per cent required support. At two places between these shafts the tunnel encountered faulted, crushed and decayed limestone, heavily water-bearing with inrushes of water carrying rock fragments and sand. In both cases, after exploratory core boring and extensive grouting ahead, small wall-plate drifts were put through to sound rock and enlargements were then made by various soft-ground tunneling methods. Tunnel excavation completed; lining under way. At both fault zones, a heavily reinforced concrete lining with a 1-inch steel plate interlining and concrete inner lining is being built across the faulted and decayed ground, 320 feet long in 11 South, 440 feet long in 12 North.

Contract 323. Seaboard Construction Corp., Mount Kisco, N. Y. Bid price, $10,810,166.50. Excavation and lining of Shafts 13 and 14, 350 and 560 feet deep respectively, and 5.8 miles of 15-foot tunnel. Shaft 13 is a drainage shaft, a 23-foot 4-inch x 26-foot 4-inch ellipse inside the outer lining; Shaft 14 is a 14-foot diameter construction shaft which will be sealed. Shaft 13 will be surmounted with a large reinforced-concrete drainage and valve chamber and a granite-trimmed brick superstructure to house the unwatering and hoisting equipment. Rock: mainly Fordham gneiss, some Manhattan schist and Inwood limestone, generally sound, blocky in places; 27 per cent supported. Water required occasional grouting ahead of excavation. Because of the large amount of special construction required at the drainage shaft, which is 100 feet from the tunnel, connected by a drift, the contractor sank, at his own expense, a 14-foot circular concrete-lined construction shaft, 13A, on the tunnel line, to expedite tunnel construction. To excavate the large drainage shaft, a 4-foot Calyx drill hole was sunk at its center to meet a rise from the drift. This hole was enlarged in two stages, the muck falling to the bottom and being removed with tunnel equipment through the drift. Tunnel excavation completed; lining under way.

Contract 324. S. A. Healy Co., White Plains, N. Y. Bid price, $10,985,200. Excavating and lining Shafts 15 and 16, both 14-foot construction shafts, 525 and 407 feet deep, respectively, and 7.0 miles of 15-foot tunnel. Rock: mainly Fordham gneiss, with granitic intrusions, and Yonkers granite, with several narrow bands of limestone, all generally sound but sometimes blocky, with enough water to require occasional grouting ahead of excavation. Heading 16 North encountered nearly 200 feet of decayed gneiss, some reduced to soft clay, with continuous mud seams, mud pockets and 10 to 25 gpm of water. Excavation advanced by wall plate drifts, heading enlargement, and bench,

(*Concluded on page 26*)



Designed for Man and Industry

American Cable engineers took wire rope (a highly standardized product nearly 100 years old) and made a basic improvement in it. They preformed it. That is to say—at the time of its manufacture, every strand and wire is preshaped to the position it assumes in the finished rope instead of merely being twisted and held in place by force. That sounds like a small thing to do—but it wasn't and the results were tremendous. Preforming made a new type of wire rope—a rope capable of giving greatly increased service.

American Cable TRU-LAY, being preformed, is a relaxed, flexible rope. It doesn't fight the men who work with it. It resists kinking and snarling. It doesn't tear workmen's hands or clothing because worn and broken crown wires in TRU-LAY don't wicker out to become vicious jaggers. TRU-LAY is a safer rope. More than this, it has amazing fatigue resistance and so lasts longer—gives better service. Yes, American Cable TRU-LAY Preformed was designed for man and industry.

BUY ACCO QUALITY *whether it is American Cable's Tru-Lay Preformed Wire Rope—American Chains (Weed Tire Chains, Welded and Weldless Chains)—Campbell Abrasive Cutting Machines—Wright Hoists—Page Wire Fence—Page Welding Wire—Page Traffic Tape—Reading-Pratt & Cady Valves—or any other of the 137 ACCO Quality Products.*

AMERICAN CABLE DIVISION
WILKES-BARRE, PENNSYLVANIA

District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco

Green Signifies Full Speed Ahead for National Preparedness

AMERICAN CHAIN & CABLE COMPANY, Inc.

USE RIGHT BUCKET FOR THE JOB

Hayward makes all four—clamshell, dragline, electric motor, orange peel. A Hayward recommendation is unprejudiced.

HAYCO

THE HAYWARD CO., 32-36 Dey St., New York

Hayward Buckets

Novel Construction Of Arch Bridge Span

T. A. Loving & Co. Devised Unusual Methods for New Edmund Pettus Bridge at Selma, Ala.

By GEORGE H. WATSON

✦ THE major problem of construction of the new $665,000 Edmund Pettus Bridge over the Alabama River on U. S. Highway 80 at Selma, Alabama, was the erection of a 240-foot steel arch span. This was solved in a novel manner by T. A. Loving & Co., of Goldsboro, N. C., contractor for the bridge proper.

The structure has an overall length of 1,248 feet 6 inches, with a 42-foot roadway divided into two double lanes by a 28-inch center curb 8 inches high, and with two 5-foot sidewalks. There are ten concrete arch spans in all, varying from 41 feet 6 inches to 154 feet 6 inches and one 240-foot steel arch span over the main channel of the river. Most of the concrete spans are on the south approach, which is 3.4 miles long and has relief openings to reduce water pressure when the river is at flood stage. The north approach is short and is anchored to a bluff on the Selma side of the river.

Erecting Main Span

For the construction of the main steel arch span, the contractor used two steel towers set on temporary anchor bolts on top of the two river piers. These towers were made up of two 42-foot 15-inch WF columns at 176 pounds (the steel wales used in the river cofferdams) tied together at the top with a 12-inch WF beam at 40 pounds, and cross braced with 4 x 3-inch angles and sheet piles. These towers were set on the piers and anchored with four 1½-inch cables from each tower to four 2½-inch anchor bolts set in the concrete arches.

After the towers were in place the erection of the steel arches was begun. Each rib contained eight sections, of which the heaviest weighed 24½ tons. Erection was started from the south pier and as each section was in place it was guyed to the steel tower with 1½-inch cable equipped with a turnbuckle to take up slack in the cable. From the south pier the two ribs were erected to the first section south of the crown which was a cantilevered section, then the north half of the two ribs was erected to the first section north of the crown. The south cantilevered section was erected, and the distance checked between this section and the north section. Then both halves of the arch were raised with the turnbuckle until they were 6 inches wider than plan distance.

Immediately after spacing the cantilevered sections of the arch and prior to inserting the crown section, temporary struts made from sections of sheet piling were bolted to the undersides of the ends of the cantilevered sections of the ribs, connecting each half to the other sufficiently to reduce vibration and tendency to side sway. Then the key sections of both ribs were dropped in place, the sheet pile struts removed, and the cables slacked off, thus connecting the two halves and swinging the arch.

Under the main steel arch there is a box clearance for navigation of 150 feet horizontally. The vertical clearance is 88 feet above ordinary low water level and 29 feet above the extreme flood mark. The roadway of the center span is approximately 99 feet above low water.

Concrete Arches

All concrete arches were placed on wood falsework centering consisting of two pile bents on varying centers to allow a maximum length of 12-foot stringers. The falsework piles were driven to a minimum bearing of 10 tons, then capped off with a 4 x 10 at the ground line. The falsework poles were then set on these caps and the forms for the arch bottom and sides built in place. Sheeting 1⅝ inches thick lined with ¼-inch plywood was used on the arch rings.

Roy Marcato Photo

The main steel span of the new bridge at Selma, Alabama.

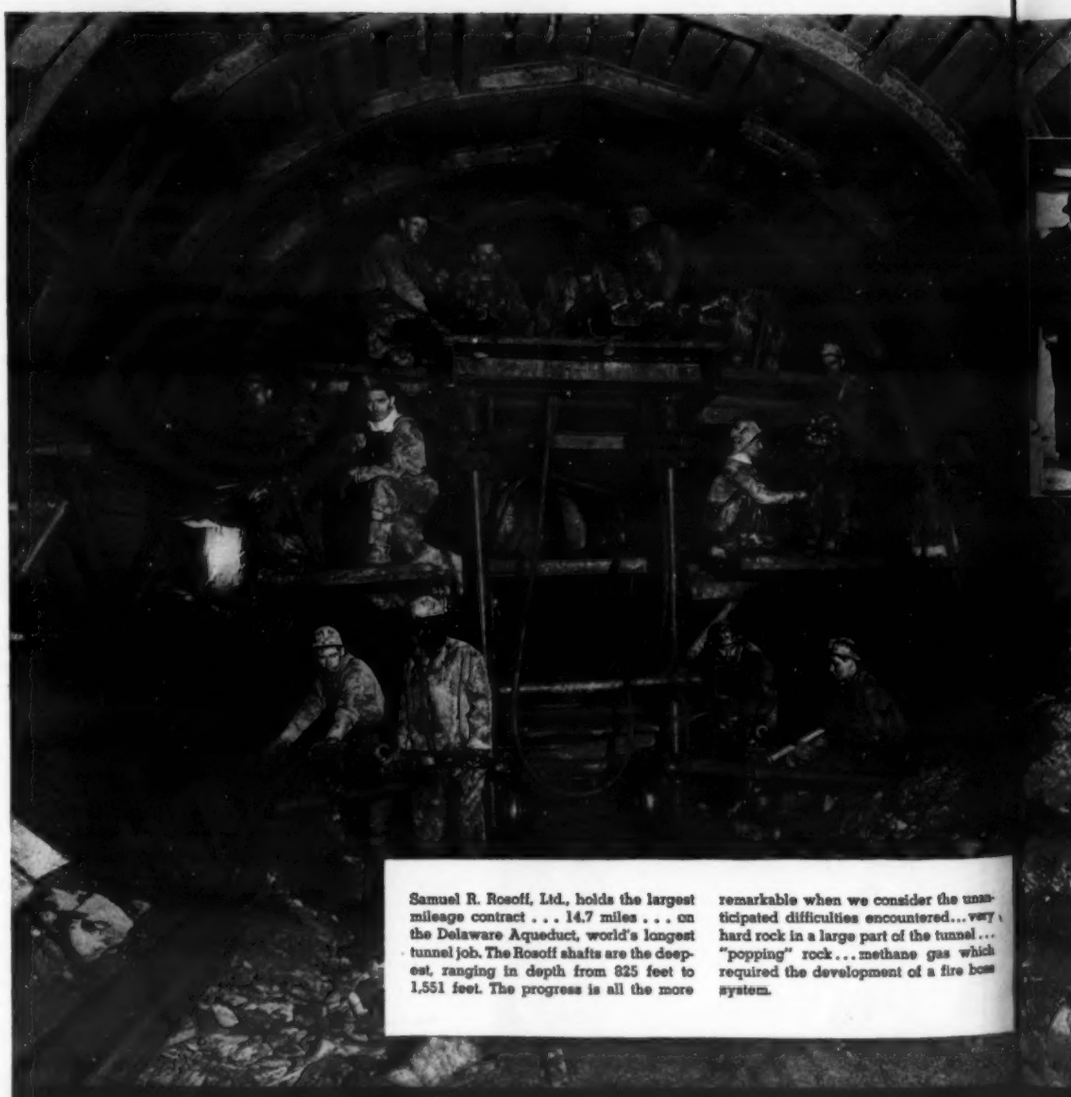
The Roadway

The roadway on the 240-foot steel arch span is carried on five columns and eleven hangers from the steel arch. The steel arch ribs rise through the sidewalk to a height of 35 feet above the roadway at the crown, giving a vertical clearance of 14 feet from the lowest portal strut to the roadway. The construction of the bridge floor is unusual, consisting of structural steel rolled shapes placed on top of the concrete arches with the floor laid on top of the steel. This sandwich arrangement greatly reduces the dead weight.

Personnel

Actual work on the Edmund Pettus Bridge was begun in November, 1938, and the structure was completed and opened to traffic last summer, replacing a bridge built in 1885. T. A. Loving of Goldsboro, N. C., was contractor for the bridge proper while the contract for the approaches, which brought the total cost of the structure to $863,000, was awarded to the Vandigriff Construction Co. of Montgomery, Ala. John S. Loving was General Superintendent for the T. A. Loving Co., and Louie Redding was Resident Engineer for the State Highway Department.

6,779 LINEAR FEET OF TUNNEL



Samuel R. Rosoff, Ltd., holds the largest mileage contract . . . 14.7 miles . . . on the Delaware Aqueduct, world's longest tunnel job. The Rosoff shafts are the deepest, ranging in depth from 825 feet to 1,551 feet. The progress is all the more remarkable when we consider the unanticipated difficulties encountered... very hard rock in a large part of the tunnel . . . "popping" rock . . . methane gas which required the development of a fire boss system.

CHICAGO PNEUMATIC

GENERAL OFFICES: 6 EAST 44th STREET, NEW YORK

New Catalog Describes Line of Paving Equipment

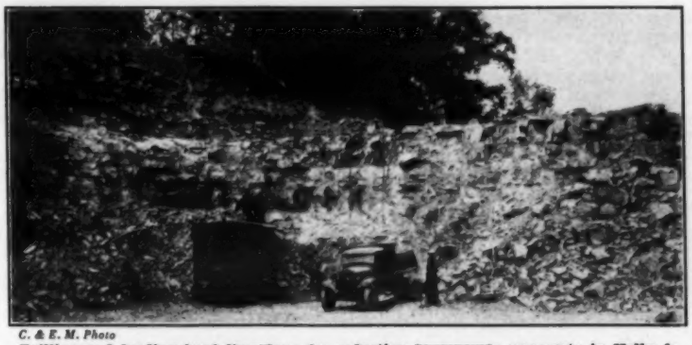
Bulletin F40-A recently issued by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio, is devoted to illustrated descriptions of the Jaeger remixing screw spreader, the Jaeger-Lakewood finisher, Jaeger forms and form tampers with information and photographs on the use of this equipment in the construction of the Pennsylvania Turnpike. The names of the contractors who used Jaeger equipment on the Turnpike are given with illustrations of their work and data on the total amount of Jaeger equipment used.

Copies of this bulletin may be obtained by those interested direct from the manufacturer.

New Catalog on Hoists

The intermediate or double-locking pawl hoist is the latest development in the ratchet lever hoist field, according to the Coffing Hoist Co., Danville, Ill. On jobs where headroom is close it is particularly adaptable as it can be stopped on a half stroke of the lever and it also has the added safety feature of two locking pawls instead of one. Catalog No. G-3 recently issued by Coffing contains complete information on this hoist and others in its line, including spur gear chain hoists, utility maintenance tools, trolleys, ratchet lever hoists, electric hoists and load binders.

Copies of this catalog may be obtained by writing direct to the manufacturer and mentioning this item.



C. & E. M. Photo

Drilling and loading hard limestone for reduction to concrete aggregate in Nally & Mudd's roadside crushing and screening plant.

Aggregate Production Subbed for Ky. Road

(Continued from page 2)

all of the drilling with 15-foot maximum length steel. Timken detachable bits were used throughout the drilling. Unusually hard rock existed all through the quarry, but in one particularly hard spot, nine bits were used to drill a hole 6 feet deep.

The holes were loaded with 60 per cent Diamond dynamite at the bottom and 40 per cent strength for the balance of the holes. The shots were fired with a hand battery.

Three Ford shuttle trucks were used to haul the broken-ledge rock from the face where they were loaded by a Northwest shovel with a ⅝-yard Amsco rock bucket. Three hand laborers were used cleaning the bench on the ledge and two others worked on the quarry floor, sledging moderate-size rock which was slightly too large for the crusher. In some cases it was necessary to resort to mudcapping.

Crushing and Screening Plant

Power for the operation of the two crushers and bucket elevators comprising the crushing and screening plant was furnished by a Caterpillar D13,000 diesel engine with a long flat belt drive. Rock from the quarry was delivered directly to a Pioneer 15 x 36 jaw crusher with no grizzly. Oversize rocks were fished out with a hooked bar. The crusher-run material was raised to a Pioneer 48-inch diameter x 20-foot rotary screen equipped to discharge oversize to an Austin No. 3 gyratory crusher which discharged to the same bucket elevator as the primary jaw crusher. The screen material was delivered in two bins, one for 2½ to 1-inch screen size material and the other from 1½ to 10-mesh.

This plant averaged 700 tons per 11 hours operation per day which was broken up into two shifts. A fleet of five trucks was used to haul the aggregate 2 miles to the batching plant of the contractor using the stone.

Personnel

The plant was operated by Nally & Mudd, contractor of Springfield, Ky., with Robert B. Nally as Superintendent. For the Kentucky Department of Highways, the project on which the aggregate was used and hence the quarry operated as a part of the same project, was under the direction of Dewey Sparks, Resident Engineer, and George Pike was Inspector at the quarry.

New Large Reflectors

The new Myrialens reflectors are designed especially for use in large letters and signs, only 20 Myrialens being required to make a letter "L" 3 feet high and with a 7-inch stroke, as compared with 70 reflectors of the usual small size required to make the same size letter.

These reflectors have 1⅝-inch diameter reflecting area and consist of 199 small integral aspherical lenses. Permanently protected against all climatic conditions, they are available in crystal, amber, red and green. They have a wing nut lock clamp one-piece assembly for installation, and are quickly put in place by inserting the stem in the hole and applying the wing nut clamp on the back of the sign. A simple wing collar adapts Myrialens reflectors for mounting directly on the face of the sign, in which case it is necessary merely to secure it in place by two small screws, one on each side of the collar.

Literature describing Myrialens reflectors may be secured by interested state and county highway engineers direct from the National Colortype Co., Inc., Bellevue, Ky., by mentioning this item.

. AND STEEL SUPPORT

in 31 consecutive working days

This is the CP MOTORdrifter which is helping Rosoff crews to outstanding performance on the Delaware Aqueduct.

Operating Staff, Samuel R. Rosoff, Ltd.:
David E. Stinson, General Master Mechanic;
James Fisher, General Superintendent;
Philip S. Miller, First Assistant Engineer;
Fred W. Stiefel, Chief Engineer;
Arthur H. Diamant, Vice President;
W. Quick, Superintendent, Shaft No. 2-A;
Walter Dunham, Superintendent, Shaft No. 3;
L. S. Penland, Superintendent, Shaft No. 2.

Samuel R. Rosoff, Ltd., is setting new progress records on the Delaware Aqueduct, New York.

Here are some typical figures:

At Shafts Nos. 2, 2-A and 3; six headings; 6,779 linear feet of tunnel were driven in 31 consecutive working days, with steel support directly to the face of each heading, using crown bars.

3,760,000 pounds of structural support were erected in the same period; 176,200 feet board measure of timber were used.

This is equivalent to driving 10,075 linear feet of unsupported tunnel for the same period, 31 consecutive working days.

Board of Water Supply Engineers:
John G. Mergott, Asst. Engr. — Max F. Freund, Division Engr.
Roderick C. St. Leger, Asst. Engr. — Arthur E. Hilliard, Asst. Engr.
Francis J. Colgan, Asst. Engr. — John Horn, Asst. Engr.

Through typographical error, the above group was referred to as Inspectors instead of Engineers in a previous advertisement.

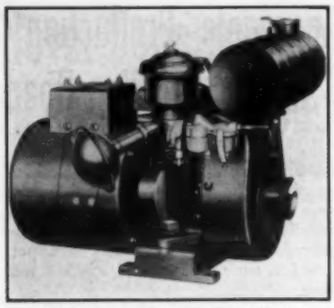
The actual value of the work performed during this period was $1,117,987.00.

CP-60 Drifters were used exclusively in drilling this footage.

For complete data on the CP-60 MOTORdrifters which are giving such outstanding performance on the world's longest tunnel job, send for copy of Catalog No. 600, "CP Contractors' Equipment".

TOOL COMPANY

SALES OFFICES AND SERVICE STATIONS THROUGHOUT THE WORLD



A U. S. portable electric plant.

Portable Electric Power on the Job

Compactness and easy portability are the features of the U. S. portable electric plants particularly designed to provide lighting and power on construction jobs, for emergency service, and for operating small electric tools. In 500, 1,250-watt and 3-kw direct-current and 1,500-watt a-c models, these plants are as light in weight as it is practical to make them, without sacrificing the essential requirements of sturdiness and quality construction, and are powered by single-cylinder 4-cycle air-cooled L-head engines of 1, 3.3 and 6 horsepower respectively.

The 500-watt unit, which is designed for miscellaneous uses, is mounted on a sub-base provided with a carrying handle. The 1,250-watt plant which will handle two 500-watt lamps and one 200-watt lamp, generating steady 120-volt current, and the 3-kw d-c and 1,500-watt a-c models are all mounted on a steel tube sub-base with the tubes extended to form carrying handles. The generators meet A.I.E.E. and N.E.M.A. requirements, and are direct-connected to the engines.

Literature containing detailed specifications on these portable electric plants may be secured by interested contractors and state, county and township engineers direct from the United States Motors Corp., Oshkosh, Wis., by mentioning this item.

A Fifth Edition of Engineers' Who's Who

Work on the new fifth edition of "Who's Who in Engineering" is now under way, under the guidance of Dr. W. S. Downs, Editor, with qualifications established by a committee of the engineering profession composed of Andrey A. Potter, Dean, School of Engineering, Purdue University, as Chairman; Col. L. B. Lent, Executive Secretary, American Engineering Council, Vice Chairman; Frederic L. Bishop, Secretary, Society for Promotion of Engineering Education; C. E. Davies, Secretary, American Society of Mechanical Engineers; H. H. Henline, National Secretary, American Institute of Electrical Engineers; T. Keith Legaré, Secretary, National Council of State Boards of Engineering Examiners; A. B. Parsons, Secretary, American Institute of Mining and Metallurgical Engineers; George T. Seabury, Secretary, American Society of Civil Engineers; Stephen L. Tyler, Secretary, American Institute of Chemical Engineers; John A. C. Warner, Secretary and General Manager, Society of Automotive Engineers.

"Who's Who in Engineering," which has proved its worth as a ready reference to personal professional data on individuals in the engineering profession, is published by the Lewis Historical Publishing Co., New York City.

Compact Chlorinators For Small Water Supplies

Contractors and engineers are frequently faced with the problem of providing safe drinking water on construction jobs beyond the reach of city water mains. To meet the requirements for a small compact chlorinator for such small water supplies, Proportioneers, Inc., 9 Codding St., Providence, R. I., recently brought out the Du-Self Chlor-O-Feeder.

This unit, which sells for less than $100, contains all the items for a "do-it-yourself" installation and provides chlorinated water at low cost. The making up of correct solution strength of hypo-chlorite for various rpm or water-pump delivery capacities has been simplified to a routine which any operator can carry through and check by the orth-otolidine test kit furnished with every Du-Self. Operated by either electric or gas-engine-driven water pumps under 25-gpm capacity, the Du-Self is guaranteed by the manufacturer for one year.

Complete information on this unit may be secured by interested contractors and engineers direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Winter Concreting

The benefits obtained by the use of calcium chloride with all portland-cement concrete poured at or below 50 degrees F. are outlined in a new folder just issued by the Solvay Sales Corp., 40 Rector St., New York City. This folder stresses nine separate advantages of the use of calcium chloride in a cold-weather concrete mix, including lower concreting costs, quicker set, high-early strength, greater final strength, extra cold weather protection, uniform curing, shorter protection period, less forms and equipment, and increased density and hardness.

Copies of this new folder "Get These Nine Advantages in Winter Concreting by Using Solvay Calcium Chloride" may be secured by interested contractors and engineers direct from the Solvay Sales Corp. or from this magazine.

Roller Bearing Uses Shown By Pictures

A novel and effective method of showing the very wide variety of service performed by Hyatt roller bearings has been used in an attractive booklet, Hyatt Rollergravure, a pictorial review of many applications where Hyatt roller bearings are employed. Copies of this will be sent free to readers of CONTRACTORS AND ENGINEERS MONTHLY by writing direct to Hyatt Bearings Division, General Motors Corp., P. O. Box 476, Newark, N. J., and mentioning this item.

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
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Calling all Concrete Men to the Concrete Industries Exposition

February 10, 11, 12, at the Sherman Hotel, Chicago

More complete than even the fine show of 1939—occupying new enlarged quarters!

The *only* major concrete machinery exhibition planned in 1941.

That only begins to describe the importance of the 1941 Concrete Industries Exposition. The past year has been no ordinary one in the advancement of concrete equipment design. All kinds of new and more efficient tools, accessories, mechanical devices and materials await your inspection.

Come and mix with the boys, and see these units that are going to *affect your methods, your bids, your profits in what promises to be a boom construction year.*

Concrete contractors, concrete products and ready-mix men, home builders interested in the fast-growing use of concrete and concrete products—general contractors, engineers and public officials—this is YOUR show! Plan now to attend.

COME... SEE HOW IT'S DONE IN '41
CONCRETE INDUSTRIES EXPOSITION
CHICAGO
FEB. 10-11-12

Held concurrently with the annual conventions of

National Concrete Masonry Association
American Concrete Contractors Association
National Cinder Concrete Products Association
American Concrete Pipe Association
Cast Stone Institute Illinois Builders' League

Sanding, Snow Fence On Connecticut Roads

(*Continued from page 7*)

snow fall. At intervals of about 200 feet steel traffic sign posts are driven into the ground immediately back of the curbs and equipped with strips of reflector buttons so that the truck driver will so manipulate the machine and plow that the blade will not injure the curb nor the special reflector buttons which are inserted in the curb at closer intervals. The posts are removed as soon as the frost is out of the ground so that they do not detract from the excellent landscaping of the Parkway during the remainder of the year.

Sanding

The Connecticut Highway Department has only 30 mechanical sanders, the remainder of the work being done by hand-casting of the sand from the back of trucks. It is felt that the uniform distribution of the sand rather lightly over the entire surface of the road makes it more easily swept off by traffic. Further, when the distribution is made by hand from the trucks the men can be more careful about approaching traffic and cause less possible damage than where some type of mechanical spreader is used.

This does not mean that the department does not feel there is a distinct place for mechanical spreaders. It purchased two for each district last year and the District Supervisors have reported favorably on them and also that local traffic has commented favorably on their use. The Department has not yet determined the type of mechanical spreader on which to standardize, the present sanders being of the disc spinner type.

Calcium chloride is used in the sand only at special locations on hills and curves and places where the drainage is poor and melted snow or ice may flow across the road. During the past winter only two carloads of calcium chloride were used for the entire state. The sand is stockpiled at all curves and hills and throughout the state highway system, wherever convenient, at intervals of not more than 10 miles and usually about 5 miles apart. In many cases because of good drainage of sand and gravel pits, it is possible to secure the material direct from the pit as needed for sanding on the highways.

Snow Fence

The state has approximately 18,050 feet of standard vertical slat snow fence and about 139,260 feet of horizontal slat fence as shown in one of the illustrations on page 40. This latter type has proved particularly effective in reducing the burden of snow deposited on the highway in sections where there are large cuts with open territory to the northeast or northwest, permitting the prevailing winter winds to sweep across the road. The snow fence is usually stored outside during the balance of the season due to inadequate storage space other than for equipment.

Personnel

William J. Cox is the Commissioner of Connecticut State Highway Department, with A. L. Donnelly, Director of Roadway Maintenance, and H. C. Carsten, Associate Highway Engineer, responsible for snow-removal and ice-control activities. Because of the importance of equipment in this work, J. E. Vehring, Superintendent of Property, and H. S. Sturm, Head Property Examiner, of the Department, are also important factors in snow-removal activities.

New Scraper Hoist

Designed especially for small scraping jobs in thin narrow veins or stopes, cross cuts, for spreading wastes and similar jobs, the new scraper hoist recently announced by the Ingersoll-Rand Co., 11 Broadway, New York City, is a small light-weight double-drum unit weighing only 250 pounds and can be passed through an opening 13 x 15 inches. It has a cable pull of 650 to 1,000 pounds and a cable speed of 125 to 150 feet a minute.

Either air or electric drive is available. The air motor is an Ingersoll-Rand Multi-Vane type with a governor which limits the free speed and conserves air. The hoist has an individual clutch lever control for each drum. All gears are totally enclosed and operate in a grease bath, and anti-friction bearings support all rotating parts. Helical stub tooth gears provide smooth quiet operation.

Copies of Bulletin 2704 containing further information on this new scraper hoist may be secured direct from the manufacturer or from this magazine.

Hardaway Contracting Co. of Columbus, Ga., used one of the first Caterpillar D7 75-hp tractors in the South with a Carryall scraper on a ditching and grading job on Highway 511 in Georgia. Here the outfit is building fill through a swamp.

1869 Penco CORRUGATED METAL CULVERTS

Easily installed—no delay and no maintenance. Guaranteed to meet U. S. and State Highway Specifications.

Durable . . Permanent
Low Cost.

One-half or entire surface bituminous coated as specified.

Please write
PENN METAL CORPORATION OF PENNA.
48 Oregon Avenue, Philadelphia, Pa.

INTERNATIONAL makes the Trucks . . . Truck Owners make the REPUTATION

The *reputation* enjoyed by International Trucks has been building steadfastly since the first high-wheeler took to the rough roads of 1907—*33 years ago.*

Today, *International* is the *greatest name in trucks* because Harvester has kept faith with the men who use trucks.

Here is the new heavy-duty International Cab-Over-Engine Model DR-500, carrying capacity of 12,000 lbs.—a typical example of how International designs trucks for every hauling need. This is one of 51 models in the complete International line.

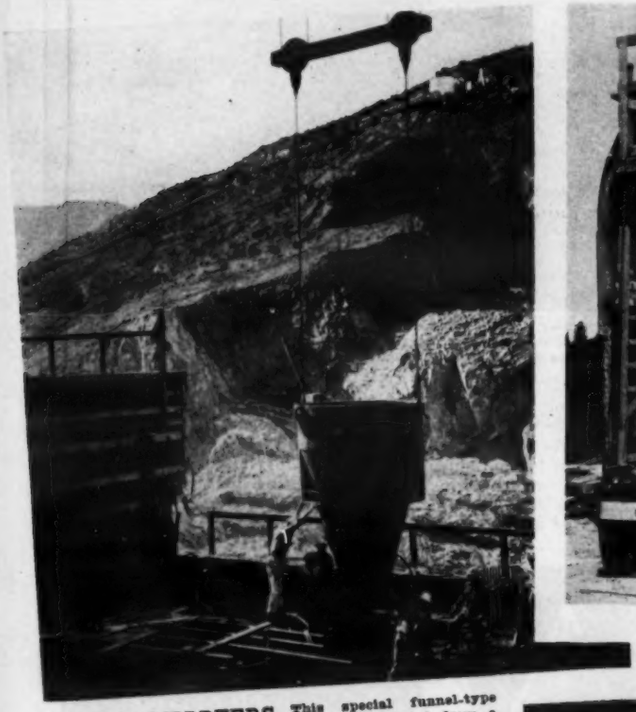
All International Trucks are *all-truck* trucks from the ground up—backed always by the world's greatest Company-owned truck service organization!

Year after year truckmen buy *more heavy-duty Internationals than any other make.* They know that Internationals give them *outstanding performance . . . unbeatable economy.*

For all-around *truck values,* join the big family of International owners. The International Dealer or Company-owned Branch near you will be glad to demonstrate the type and size best suited for your business.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago, Illinois

INTERNATIONAL TRUCKS



CLOSE QUARTERS. This special funnel-type bucket, suspended from a high line, is used to pour concrete in close quarters at Shasta Dam in California.

WHAT'S THIS? Not something new in trailers, but a side-wall and arch form for the tunnels on railroad relocation at Shasta.

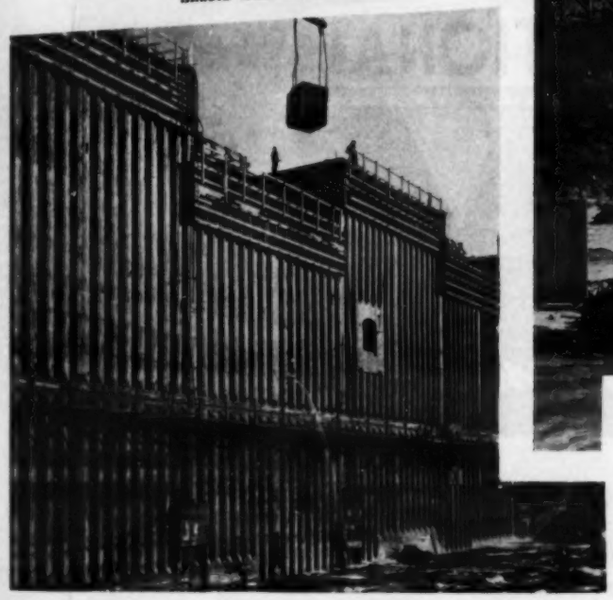
GIANT CONVEYOR. The world's longest belt conveyor system for delivering aggregate to Shasta spans the Sacramento River on a 75-foot high steel bridge placed by a special truck crane with heavy-duty outriggers and a 90-foot boom. The conveyor is 9.6 miles long.

CONSTRUCTION

at SHAS

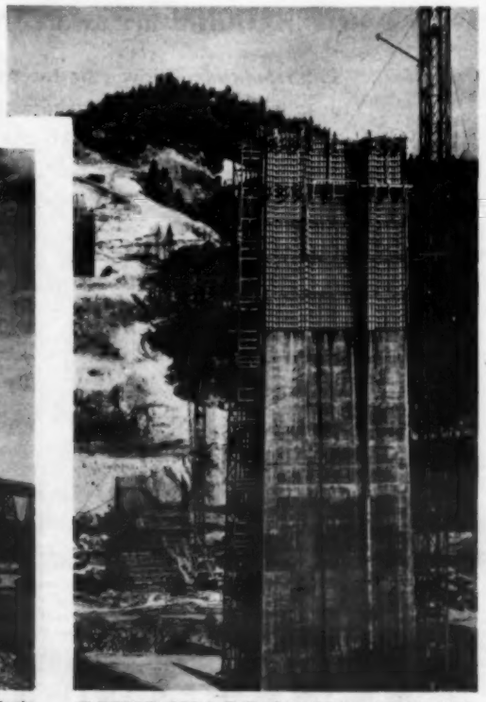
Work on this giant dam secon
of 30 miles of railroad and 15

Bureau of Reclamation Ph

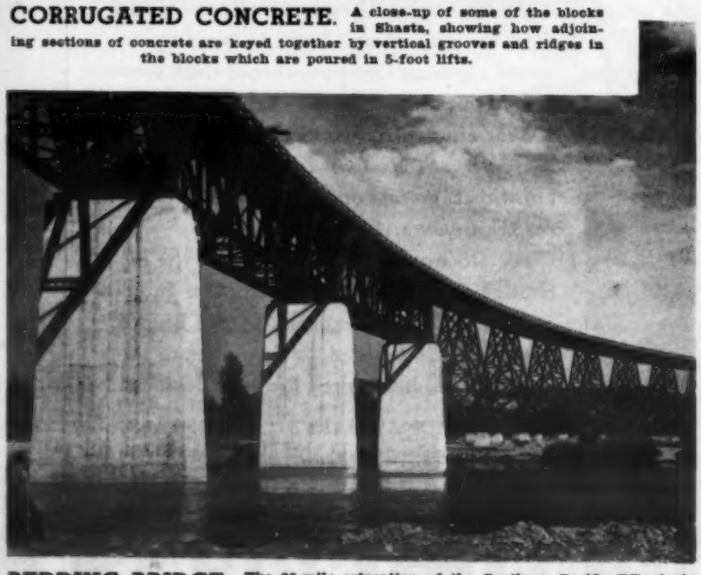


CORRUGATED CONCRETE. A close-up of some of the blocks in Shasta, showing how adjoining sections of concrete are keyed together by vertical grooves and ridges in the blocks which are poured in 5-foot lifts.

PERSONALITIES. From Lowry to Kyle to W
conservation of water reso
Construction Engineer for the Bureau of Reclamation at
gineer of California; Dr. Baldwin M. Woods, Regional C
Board; and William E. Warne, Director of



GOING UP! Tall piers for the world's highest double-deck span for railroad and highway over an arm of the reservoir.



REDDING BRIDGE. The 30-mile relocation of the Southern Pacific RR starts at Redding with this 4,247-foot curved bridge, longest on the project, constructed by Clifford A. Dunn and the American Bridge Co.

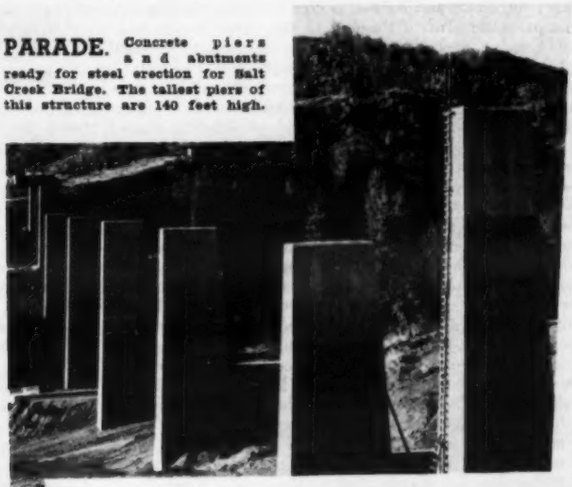
THREE TO GO. O'Brien Creek Bridge, sixth to steel bridges on the relocation above Baird. This relocation improves both line and

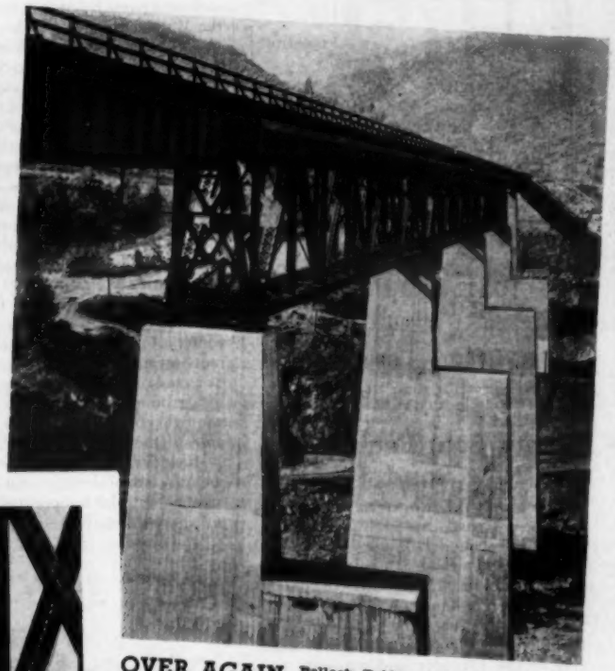
UCTION BOOMS
HASTA
dam necessitated relocation
oad and 15 miles of highway
Photos

to Ky to Woods to Warne goes a discussion of of wate resources. Left to right, Ralph Lowry, Reclamation at Shasta Dam; Edward Hyatt, State En- ods, Regional Chairman, National Resources Planning se, Director of Information for the Bureau.

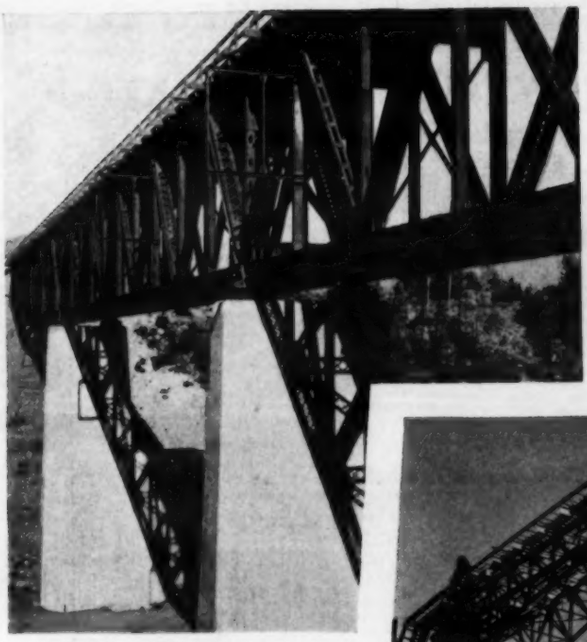
Bridge, sixth to be completed of the nine concrete and the relocation around Shasta, spans a tributary stream both line and grade for the railroad.

PARADE. Concrete piers and abutments ready for steel erection for Salt Creek Bridge. The tallest piers of this structure are 140 feet high.

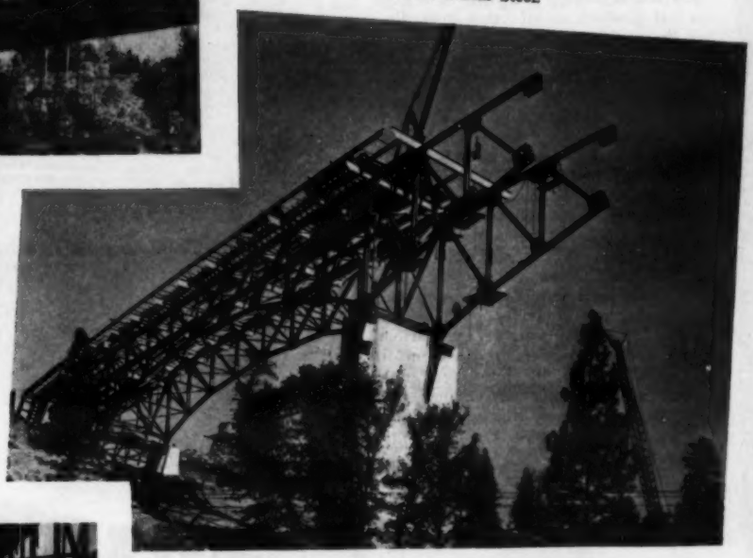




OVER AGAIN. Pollock Bridge, 180 feet high above the tracks of the existing line, is the second crossing of the Sacramento River. Superstructure by Bethlehem Steel.



DONEY CREEK. The contract for this bridge over another tributary crossing north of Pollock was awarded in 1939 and the superstructure is being erected by Bethlehem Steel Co.



ANTLER BRIDGE. Steel arch spans going up for a four-lane highway structure to bridge the upper Sacramento River arm of the reservoir created by Shasta. This bridge will be 1,330 feet long and 200 feet high.

BACK AGAIN. The railroad jumps back to the east side of the canyon at the third crossing of the Sacramento River.

TWELVE TUNNELS were required by the railroad relocation at Shasta. Here the railroad makes its fourth crossing of the Sacramento River and enters into the last of the twelve tunnels on the relocation.

Rear view of the Good Roads Model T spreader with the safety seat.

Safety Seat Feature Of New Sand Spreader

The safety of workmen engaged in sanding icy roads has been provided for in the latest model of the Good Roads sand spreader which is equipped with a special safety seat. Located conveniently at the right-hand side of the rear of the truck, this seat makes it possible for the operator to control the flow of material to the spreader and prevents possible injury from on-coming traffic.

The comfortable seat, sturdy platform and strong railing are held in a horizontal position at all times, regardless of the position of the truck body, by a steel radius rod firmly fastened to the truck frame. The railing in front of the seat serves as a control lever for opening and closing the door in the tail-gate. The chute is so designed that it will tilt up or down in accordance with the position of the truck body. The complete safety seat, consisting of the seat device, tail-gate and door, and chute is adjustable to fit any truck. The tail-gate is 24 inches high, and the width is adjustable. The complete unit weighs 350 pounds.

Copies of literature describing and illustrating this Model T and safety seat spreader unit, as well as the various other spreader models for ice control, may be secured by interested state, county and town highway engineers direct from the Good Roads Machinery Corp., Kennett Square, Penna., by referring to this item.

Three New Devices For Arc Welders

In an effort to eliminate the waste incurred from frequent idling of an arc welder between jobs, a new automatic start and stop device for use on any magnetic-starter motor-generator arc welder driven by an a-c engine, such as the Wilson Hornet, has been announced by the Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City. With this device the operator starts the welding unit simply by touching the work with his electrode holder and the unit keeps running as long as he is welding. When welding is interrupted, the machine automatically stops after a time delay which may be set between ½ and 1½ minutes to suit the conditions of the job. The device is reconnectable for 220 or 440 volts and is easily installed on or near the machine.

Another Wilson device for arc welding machines is a remote control device which allows minute adjustments in current output by merely touching one of two contacts on the electrode holder to the ground. To use this device, the handwheel which governs the control pole of the standard welder is replaced by the reversible motor-driven Type SC remote control device. The 1.80-hp electric motor which operates the control pole is protected by two limit switches and by a slip clutch to prevent damage when the end of the range is reached. The generator may be pre-set by push buttons mounted on the control itself.

For installation on arc welding machines when they must be used on either of two line voltages at different times, Wilson has brought out a dual voltage switch. Normally, adjusting a motor so that it will operate at a different line voltage requires changing the heater elements, disconnecting and reconnecting the motor and magnet coil leads, requiring from ½ to 2 hours. With this switch, it is stated that the change can be made in less than a minute. The switch has two main parts: a base mounted directly on the machine and a removable top cover with three equally spaced tabs which fit between bosses on the base. The top cover can be set on the base in either of two different positions, each corresponding to a line voltage. This switch is designed for 220-440 volts.

Further information on any or all of these devices for use with arc welding machines may be secured by those interested direct from the manufacturer by referring to this item.

New Scraper Booklets

Small scrapers that can be used effectively by counties, in airport construction, for ditching, stripping, dams and foundation excavation, are described and illustrated in a new folder A-012 recently issued by R. G. LeTourneau, Inc., Peoria, Ill. Devoted to Carryalls in sizes from 3 to 11 yards heaped measure, it stresses their use both as utility units and tools to handle the entire job.

Bulletin A-014 presents the factors that determine the selection of large Carryall scrapers, from 15 to 33-yard capacities, in an interesting pictorial form. The advantages of using large scraper sizes are pointed out and suggestions for supplementing scrapers with other LeTourneau equipment to increase productive earth moving are given.

Copies of either or both of these folders may be obtained by writing direct to the manufacturer.

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Easier Dumping—

WITH SMALLER WHEELS—QUICKER, FASTER BARROW LOADING. NOW YOU CAN RUN YOUR CONCRETE BARROWS RIGHT UP UNDER THE MIXING DRUM. 3½-T HAS PNEUMATIC TIRES, STURDY POWER, etc. WRITE TODAY.

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READY FOR YOUR TOUGHEST JOBS RIGHT FROM THE START!

THERE'S a reason why the Ford Motor Company has built *and sold* more trucks than any other manufacturer. It's because Ford units give a full measure of service right from the start.

For example, you get *full value* from your new Ford Truck the very moment you put it to work on your job. Its precision-built engine does *not* have to be "broken in"! By the time the first 100 miles have clicked across the speedometer, you can drive your unit as fast as the law and road and traffic conditions permit. No "coddling" here. Your new Ford Truck pays dividends from the day you take delivery.

Because of rugged construction, top performance and high dependability, you can count on Ford operating economy.

Put a Ford Truck to work for you in 1941! Ask your dealer for a *free* "on-the-job" test that will prove what a Ford unit can do for you under *your own* operating conditions.

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FORD TRUCKS, COMMERCIAL CARS, STATION WAGONS AND TRANSIT BUSES

Ford

Delaware Aqueduct

(*Continued from page 9*)

struction Co. and J. P. Shirley, Mahopac, N. Y. Contract completed. Final estimate, $1,784,732.36. Six shafts, Nos. 7, 8 and 9 Uptake, 790, 950 and 320 feet deep, respectively, all 14.0 feet in diameter, and Shafts 9 Downtake, 10 Uptake and 10 Downtake from 320 to 440 feet deep and all 15.0 feet in diameter. Total depth of all shafts in this contract, 3,145 feet. Material penetrated: Highlands gneisses, granites and schists. Some shafts and headings encountered considerable water, necessitating extensive grouting.

Contract 336. Dravo Corp., Pittsburgh, Pa. Contract completed. Final estimate, $3,947,542.32. Ten shafts, Nos. 17 to 23, inclusive, there being two shafts each at three locations: 17, 18 and 19. Nine shafts are of 15 to 19.5 feet in diameter. Shaft 23, a drainage shaft, is 22 feet 0 inches x 32 feet 2 inches ellipse inside the concrete lining. Depths varied from 320 to 835 feet, and total 5,100 feet. Rock formations are mainly Fordham gneiss with Yonkers granite intrusions and Manhattan schist, some Inwood limestone. Rock is much folded and faulted, often blocky, sheared and jointed; at some shafts it carried considerable water, requiring frequent grouting ahead of excavation.

The tunnel contracts and the work involved in them are described in the companion article on this project, also starting on page 1 of this issue.

Public Health and Safety

As required by statute, the Board of Water Supply police, recruited from the New York City Civil Service lists, maintain order at all working places and safeguard neighboring rural areas. To avoid smoke and dust, the use of steam power in residential areas is prohibited. As a matter of fact, all contractors use purchased electric power for all fixed equipment. Also, in residential areas, the hours of blasting are limited until the headings have been advanced more than 1,000 feet from the shafts, the sharpening of steel and other noisy operations at night are prohibited, mufflers and silencers are required on all noisy exhausts, blowers and compressors, steel muck hoppers are lined with noise-deadening material and, in the most highly developed residential area, the head frames of Contract 308 were completely enclosed in sound insulating material. In residential areas and near important railroads or highways, underground magazines were required; these were of such location, size and construction that the accidental detonation of the entire 3,000-pound content of dynamite would not endanger shaft or tunnel.

Good roads and available housing in nearby communities eliminated the need of labor camps. At all working places, however, excellent locker houses with ample showers, hot water, and water-flushed toilets were provided. Except where public sewers are available or where the discharge is into the otherwise polluted Hudson River, all sewage is purified by septic tanks, intermittent sand filters and chlorination; pumpage from the shafts and tunnels is settled and chlorinated and, where muck is dumped in or along the shores of reservoirs, the muck is sterilized by drenching with a hypo-chlorite solution before dumping. In some cases the entire flow of the stream receiving surface drainage from the working area is chlorinated. Camp water supplies not from an approved public source are chlorinated and, like the effluents of all purification works and the sanitary conditions of the streams receiving drainage from the working areas, are under constant laboratory check-up and control, it being the purpose, whether or not the stream is used for public water supply, to leave it in at least as good a condition below the works as it is above.

For the protection of the personnel engaged on the work, each contractor is required to employ a full-time safety engineer, and the Board of Water Supply maintains three safety engineers, one for each field department. The New York State Department of Labor also conducts frequent inspections, and the U. S. Bureau of Mines is co-operating. The most advanced powder-handling and blasting practices are being followed, including the use of safety primers. Many of the men were given first-aid training and at each working place a well-equipped first-aid room with a trained nurse in attendance and facilities for prompt medical aid and hospitalization are maintained. In tunnel headings frequent tests are made for carbon monoxide, methane, rate of ventilation, and dust count, the dust being kept below 10,000,000 particles per cubic foot. Co-operation by the Division of Industrial Hygiene of the New York State Department of Labor, the drill manufacturers, and the contractors has made the Delaware Aqueduct the pioneer and outstanding example of the effective control of dust in rock tunneling.

Equipment Contracts

In addition to the 21 construction contracts completed or under way, six contracts for the first-needed mechanical equipment have been let. These equipment contracts, for such items as bronze riser valves, shaft caps, access doors between tunnels and drainage shafts, gate valves and piping, and cast-iron sluice gates and valves, total $1,862,523, bringing the total of work completed and contracts under way to $172,555,797.

Personnel

The Board of Water Supply which is building the Delaware Aqueduct project consists of George J. Gillespie, President, Henry Hesterberg and Rufus E. McGahen. Charles M. Clark is Chief Engineer; Roger W. Armstrong, Deputy Chief Engineer; and Department Engineers are Harry R. Bouton, Headquarters Department, in charge of design; James A. Guttridge, Watershed Department, in charge of reservoir and dam construction; Neil C. Holdredge, Northern Department, aqueduct construction contracts 313 to 321, inclusive (Shafts 2 to 10); and John M. Fitzgerald, Eastern Department, aqueduct construction contracts 322 to 324 and 306 to 308 (Shafts 11 to 23 and 1 A North).

Contractors—Prevent loss of tools and other equipment with this EVERHOT Branding Iron
This inexpensive Branding Iron may also be used as a soldering iron or blow torch.
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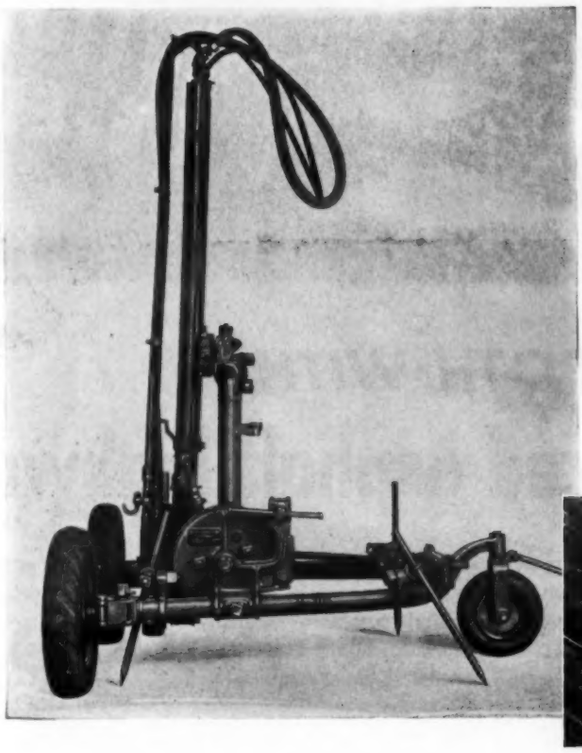

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UNIVERSAL MOUNTING . . . permits setting up for drilling in any position. Provides sturdy simple mechanism for operating the U-arm.

PNEUMATIC FEED . . . gives the operator positive control, for fast drilling in all kinds of rock. An important modern feature that multiplies man power.

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RDO-4A

New Booklet Describes Welded Dragline Bucket

A new booklet describing the new P & H Biglode dragline bucket recently placed on the market by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., has just been issued by that company. The booklet, known as Bulletin D-9, illustrates with photographs and diagrams such features of the bucket as the welded alloy steel construction, simplified design, cable replacement system and flared lip and reversible teeth assembly. According to the manufacturer, the Biglode bucket is designed for all-around service and embodies a system of streamlined balance for easier handling.

Copies of Bulletin D-9 may be obtained by those interested direct from the manufacturer.

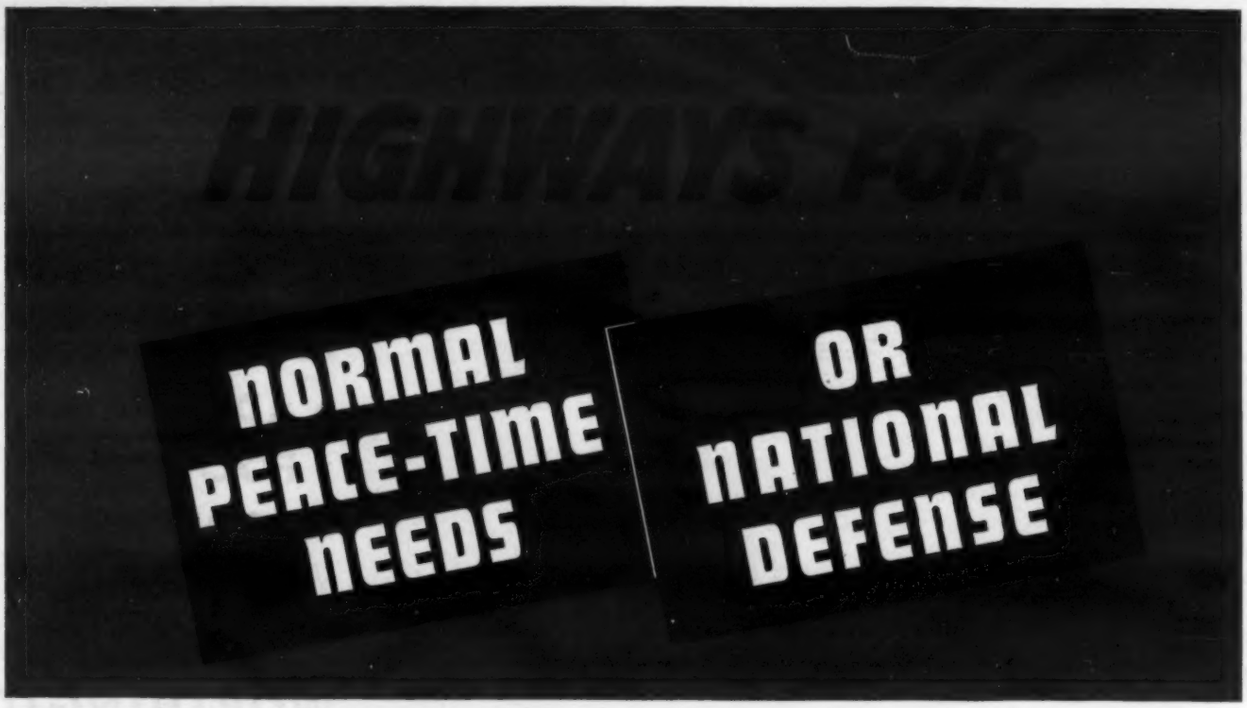
Cleaning Iron and Steel

Air Reduction, 60 East 42nd St., New York City, has recently issued an 8-page illustrated booklet entitled "Flame Cleaning and Dehydrating Iron and Steel." The first part of the booklet is devoted to a reprint of an article discussing the problem of keeping the Golden Gate Bridge in condition and how Airco equipment was employed in flame cleaning and dehydrating operations, and the second part consists of the text of a paper delivered at the Annual Meeting of the American Toll Bridge Association and discusses the economy of efficient maintenance of steel structures, and the important part played by flame cleaning in this program.

Copies of this booklet, ADG-1073, may be obtained by writing direct to the manufacturer and mentioning this item.

New Goodrich Adv. Mgr.

The B. F. Goodrich Co., Akron, Ohio, has announced the appointment of George F. Cozzens as Advertising Manager of the tire division. Mr. Cozzens joined the Goodrich organization in 1934 as Sales Promotion Manager in the Washington, D. C., District and in 1938 was appointed Advertising and Sales Promotion Manager of the associated tire lines division.



GET BOTH WITH

a balanced asphalt highway plan

● There are a great many reasons for putting highway and airport construction plans in gear with the stepped up pace of army mechanization. Roads, bridges and airports are vital to a fully mechanized army. But these same facilities are of almost equal importance to the development of any community highway system in peace time.

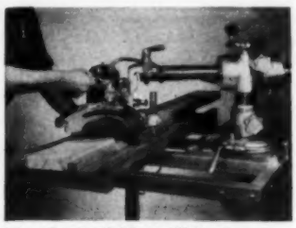
For instance, an adequate system of secondary roads for defense makes it possible to move troops into an area while evacuating civilians. But these same secondary roads in peace time would relieve the Sunday and holiday traffic on main highways.

The National defense program has added the need for *speed* in developing *more* highways at *low cost*.

Consider these facts, whether you are planning "defense" highways or your regular program. There are many types of asphalt construction. After considering local traffic requirements, soil conditions and available aggregates, you can pick the type that is most economical for your need. Fast, safe all-weather surfaces can be laid quickly—roads or airport runways are out of service but a short time. Asphalt surfaces are easily maintained and you get the maximum mileage for your money.

Adequate stocks of all types of asphalt are available throughout the Middle West. Write to Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago, Illinois. In Nebraska, call or write Standard Oil Company of Nebraska at Omaha.

Asphalt for every purpose STANDARD OIL COMPANY (INDIANA)



The Porter-Cable radial saw arm and Speedmatic saw.

New Radial Saw Arm Used with Hand Saw

Although the many sawing and woodworking jobs in construction and state and county highway department shops are usually handled with a hand saw, there are many operations which can be handled more efficiently on the radial arm type of machine where the saw is mounted rigidly on the arm and travels through the material. In the past, it has been necessary to purchase two complete machines to take care of all types of wood work, a hand saw and a radial arm saw complete with power unit.

Now the Porter-Cable Machine Co., Syracuse, N. Y., is offering a radial saw arm to which its Speedmatic electric hand saw can be attached to provide a radial arm saw where such a unit is required. This radial arm with a wood work table is mounted on a steel frame and stand to provide an accurate and sturdy sawing unit. Its long arm allows a stroke of 26 inches, and a rip guide may be placed at the rear so that stock 65 inches wide may be halved. The arm may be raised 7¼ inches by means of a large hand wheel with a handle actuating a screw mounted on ball bearings and enclosed. The arm, which may be swung right or left and is locked securely by a lever, runs on ball bearings and moves at the slightest pressure.

Literature describing and illustrating this radial arm and the Speedmatic electric hand saw for use with it may be secured by interested contractors and state, county and town highway engineers direct from the manufacturer by mentioning this item.

Paving Brick Assn. Meeting

The Thirty-Fifth Annual Meeting of the National Paving Brick Association will be held in Toledo, Ohio, on January 15, 16 and 17 at the Commodore Perry Hotel. In addition to the business meetings, many of the sessions will be open to the general public.

The relationship of the modern brick pavement to the highway problem of the present and the future will be an important theme of the convention. Among the subjects to be discussed are vibrated monolithic brick pavement, the modern two-course pavement, additional experience with reinforced slabs, and other brick pavement projects which are attracting attention in the highway technical field.

C. C. Blair, head of the Metropolitan Paving Brick Co., Canton, Ohio, is President of the National Paving Brick Association and William H. Cullimore is Chief Engineer and Secretary.

Highway Markers

Evans Luster-Lite markers have been designed to make night driving safer on any type of highway and under any weather conditions, according to the Evans Products Co., Detroit, Mich. A new catalog recently issued by this company is given over to descriptions and illustrations of two models of bi-directional markers, three models of single-face markers for installation on wood, steel or concrete posts, bridge abutments and guard rails, individual Evans Vitra-lux buttons, safety zone markers, and standards for use with either single or two-face markers. Illustrations show the proper method of installing the single-face markers in steel, wood or concrete.

Copies of this catalog may be obtained by state and county highway engineers direct from the manufacturer by mentioning this item.

New Timken Division Mgr.

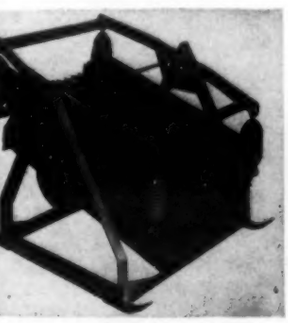
Announcement has been made by the Timken Roller Bearing Co., Canton, Ohio, of the appointment of George W. Curtis as Milwaukee Division Manager, with industrial and automotive bearing sales as well as alloy steel sales activities of this division under his supervision.

FORM WORK AND RICHMOND ARE SYNONYMOUS

Small residences are Richmond-tied as economically as big dams or bridges.

See "Sweet's" 3-51.

RICHMOND SCREW ANCHOR CO., INC.
838 Liberty Ave.,
Brooklyn, New York



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accurately separates 3 sizes of 100 tons of material per day. Uses only the power of 2-hp. gas engine or 1-hp. electric motor. Self-contained, easily moved. Ideal for road and construction work, concrete block making and in small quarries and factories. Available through your local equipment distributor.

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Offices in principal cities.

WALTER 4-POINT POSITIVE DRIVE *licks winter's meanest jobs*

Winter's toughest jobs are all in the day's work for WALTER SNOW FIGHTERS. Whether it's a case of punching a road through heavy snowdrifts, scraping hard-packed snow and ice down to bare pavement without damage to the road surface, spreading sand over danger spots, or what-have-you, you can count on WALTER FOUR-POINT POSITIVE DRIVE to see you through. And what is this famous drive? It's a matter of exceptional traction resulting from a combination of features found complete only in Walter Tractor Trucks. That means Automatic Lock Differentials, Suspended Double Reduction Drive, High Ground Clearance, Tractor Type Transmission, Superior Braking Capacity and other important points that give Walter Snow Fighters what it takes. Order Walter Snow Fighters now and be sure of open roads for your community this winter and for many winters to come.

Send for literature

WALTER MOTOR TRUCK CO.
1001-19 IRVING AVENUE, RIDGEWOOD, QUEENS, L. I., N. Y.

Excellent Progress Made in Tunnels

(*Continued from page* 15)

with full-circle steel ribs erected in six segments. This is one of only two contracts on which any important quantity of dry packing was required. 6.8 miles excavated, 51 per cent requiring support.

Contract 306. Associated Contractors, Inc., Valhalla, N. Y. Bid price, $21,333,333.33. Deepening of two 18-foot shafts, Nos. 17 Downtake and 18 Uptake, previously excavated under Contract 336, by about 190 feet each to final depths of 1,020 and 1,014 feet respectively, the excavation and lining from double Shafts 17, 18 and 19, of 6.4 miles of 15 and 19.5-foot tunnel, and the construction of the Kensico influent chamber and coagulating plant, Kensico effluent chamber, Kensico aerator, a filter connection chamber, two steel sheet pile cellular cofferdams, two rolled-earth dikes with steel sheet pile cores, and accessory structures. Surface construction involves more than 650,000 cubic yards of excavation, more than 950,000 cubic yards of refilling and embanking, 150,000 cubic yards of concrete masonry, nearly 20,000 tons of metal work to be furnished by the contractor, and more than 1,000 tons of equipment and metal work to be furnished by the City. Rock: Fordham gneiss, Yonkers gneissoid granite, Inwood limestone and Manhattan schist, much folded and faulted, and in many cases wet, requiring frequent grouting before excavation; 100 per cent required support. Faulting and deep decay necessitated placing the by-pass tunnel under Kensico reservoir, between Shafts 17 and 18, more than 1,000 feet below the flow line of the reservoir, at 650 to 660 feet below sea level, the deepest on the entire Delaware Aqueduct. At this depth generally sound rock with little water was found.

In Heading 19 South, however, faulted and decayed rock at a schist-limestone contact gave an inrush of water carrying large quantities of sand. Core borings driven through a massive concrete bulkhead showed about 60 feet of decayed rock of the consistency of sand and clay, followed by jointed limestone. After repeated grouting, to control leakage and consolidate the ground, two heavily-timbered bottom drifts, about 130 feet long, were pushed through to the hard limestone beyond the decay. One encountered little difficulty, but the other met a series of inrushes of water carrying much sand. Concrete walls were built in these drifts, other drifts were excavated on top of them and the walls built up and wall plates set, then a top center drift driven, this drift widened in short lengths with steel channel poling where necessary, and a set of steel supports placed resting on the wall plates. The core of the heading was excavated when the roof support was in place throughout the decayed zone, and finally the bench was excavated. The tunnel lining for about 300 feet across this fault will be heavily reinforced and will have a ½-inch watertight steel plate interlined.

Tunnel excavation completed; tunnel concrete about three quarters completed.

Contract 307. S. A. Healy Co., White Plains, N. Y. Bid price, $10,097,135. Excavation and lining of 5.0 miles of 19.5-foot tunnel from Shafts 20 and 21, the erection of two 48-inch risers in each shaft, and the construction of an underground reinforced-concrete valve chamber at the head of each shaft. Rock: mainly Manhattan schist and Yonkers granite, some Inwood limestone and Fordham gneiss, much folded and faulted, generally blocky; sheared, decayed and altered to clay and chlorite in places; 78 per cent required support. It was often necessary to keep the steel roof support close to the face and large quantities of dry packing were used. Three cave-ins occurred, wrecking the steel support. A 115-foot length of completely reinforced concrete lining was erected in one caved heading before resuming excavation. Tunnel excavation completed; lining about two-thirds completed. On this contract the concrete traveler rails are supported on piers built of concrete in bags.

Contract 308. J. F. Shea Co., Inc., and Henry J. Kaiser, Yonkers, N. Y. Bid price, $11,971,885. Excavation and lining of 5.3 miles of 19.5-foot tunnel from three shafts, the construction of two 48-inch risers in and a reinforced concrete underground valve chamber at the head of Shaft 22, completion of the drainage shaft, drainage chamber and equipment and a granite-trimmed brick superstructure at Shaft 23, and erection of a granite-faced superstructure at Shaft 1A North. Rock: Yonkers granite and Fordham gneiss, folded, faulted and crushed in places, and much of it sheared, jointed, blocky or slabby, and moderately wet; 98 per cent required support. A major crush zone was encountered in each heading from Shaft 23. Of that in the north heading, 9 feet was practically mud. Excavation was by advance grouting, top center drift and wall plate drifts, and piecemeal enlargement. A water-tight interlining of ⅞-inch steel plate, 279 feet long, surrounded with heavily reinforced concrete, will be built across this fault. The crush zone in the south heading was controlled by grouting and careful full-face excavation. Tunnel excavation and about three-fourths of the lining completed.

—On your shovels and on your trucks—
USE PALMER Friction Materials
for every kind of braking

Write today for information on how YOU can save up to 50% on lining costs.

27 years' experience in producing the best in brake and friction products.

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DO IT BETTER
DO IT CHEAPER

★ If you want plenty of power . . . speed . . . sturdy construction . . . low operating and maintenance cost . . . dependable service and properly engineered features, investigate HUBER. Write for complete descriptive features.
THE HUBER MFG. CO.
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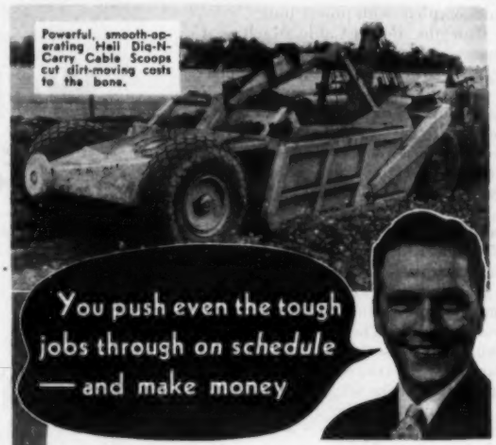
6 SIZES 5 to 12 ton GAS or DIESEL

Buy a HUBER

Road Builders

Planning to attend the American Road Builder's Association Convention this year?

It will be of more than usual interest on account of the importance of highways in the national defense program. Remember the time, *January 27-31* and the place—*Pennsylvania Hotel, New York City*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You push even the tough jobs through on schedule — and make money

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Heil equipment helps you make even the toughest jobs pay out in profits. For in the *complete* Heil Road Machinery line you have the *right* units to do the work *right* . . . to help assure you of clean-cut, on-time jobs that bring other work your way. Famous Heil advantages — such as fast loading and dumping, accurate cutting and spreading, short turning radius, and easy hitching and unhitching — bring you real savings in time and service expense. Equip yourself for *profitable* operation with Heil Dig-N-Carry Scoops, Trailbuilders, and Bulldozers. Write today for free catalog.

★ Left: Heil Hydraulic Dump Units are sturdy . . . fast . . . dependable.

★ Tractor owned by Shafer Construction Co., Madison, Minn. has dual hook-up for operating either a Heil Hydraulic Scoop or a Heil Trailbuilder.

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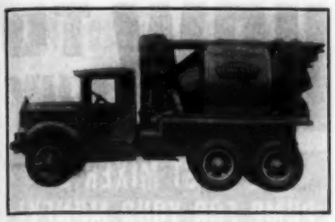

One of the new Rex truck mixers.

Line of Truck Mixers Has All New Design

Primary among the features of the new line of Rex Hi-Discharge Moto-Mixers and Moto-Agitators, recently announced by the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis., are rear charging, a new mixing principle, and a high discharging point for greater spouting range.

The new Rex mixing principle is said to scour all parts of the drum, because there are no inaccessible places for the cement to build up, thus making the drum self-cleaning and resulting in a faster and better mix. The drum has only one opening for both charging and discharging. There is a large wide rear charging hopper which has a triple function, serving as a receiving hopper for aggregate while charging, a stationary throw-back blade while mixing, and at the same time affording visibility and opportunity for sampling of the batch. Aiding the high-discharge feature are the Rex Quint-Spout which has five chuting lengths and the Rex zipper spout suspension.

Other features include the completely enclosed anti-freeze water system, in which all water lines and valves are protected by the heat of the motor against freezing; the new and improved chain belt drive; twin clutch transmission; and the man-size inspection hatch with a quick-acting removable door large enough to allow the passage of a man for drum inspection.

These and the Rex features of previous models, such as Man-Ten steel, three-point drum mounting, self-measuring water system, and friction throttle, are standard equipment in the 2, 3, 4 and 5-yard sizes in which the new Rex Hi-Discharge is made.

New Journal Jack

A new hydraulic two-speed journal jack having a capacity of 25 tons, with a 6-inch rise, has recently been announced by the Buda Co., Harvey, Ill. This new Model 25H10 is designed for use in garages and maintenance depots where raising and lowering operations must be under complete control at all times. The height of this jack closed is 10 inches and its weight 45 pounds.

Among its features are its completely hydraulic operation providing complete control of the load at all times; its two speeds, one fast speed for medium and light loads and a second speed for heavy loads; a positive stop at the limit of the rise, so arranged that it is impossible for the ram to bind in the cylinder at the rise limit; rugged construction, with the ram of solid bar stock and the base of high-strength malleable iron; and a swivel handle to provide for ease in carrying.

Further information on this new hydraulic jack Model 25H10 may be secured by interested contractors and state and county highway departments direct from the manufacturer by mentioning this item.

New Safety Goggle

Retaining its former features and incorporating three new ones, the new Monelite goggle, made by the Dockson Corp., 3839 Wabash Ave., Detroit, Mich., is designed to provide greater comfort, decreased weight, and easier adjustment through a new broader facial contact, a new nose bridge adjustment, and the new Dowmetal bezel.

As a result of the bezel of Dowmetal, which is 36 per cent lighter than aluminum, extra weight is eliminated by allowing thin section construction without sacrificing strength or durability. This bezel allows a greater range of vision and is easily removed from the goggle cup. Quick and easy adjustment to various head sizes is possible with the new nose bridge adjustment. The new broader facial contact, with anatomically correct right and left eye cups, gives a snug comfortable fit to the face without irritation to the wearer. A complete selection of 50-mm shatterproof industrial hardened and welding lenses is available.

The Monelite goggle has a still greater range of utility and safety when Baffl-Vent and rubber face pads are used. The Baffl-Vents provide protection at the sides of the goggles and the rubber pads can be readily snapped on where there is intense heat and a cushion is needed between the face and goggle.

Two Welding Hose Lines Are Molded Into One Unit

Twin-Weld hose, manufactured by the Hewitt Rubber Corp., Buffalo, N.Y., is a patented construction putting both the acetylene and oxygen lines into one complete unit, eliminating entirely the need for makeshift taping of individual lines to prevent the tangling and sprawling of separate hose. By cutting through the connecting fin, the two lines are easily separated for coupling to tanks and gun. Ferrules, crimped in place, will prevent further separation. For identification the acetylene line is red and the oxygen line is green.

Copies of a bulletin describing this welding hose in detail may be obtained direct from the manufacturer by mentioning this item.

Do you wish a really superior dumping unit for handling 1-cu. yd. Detachable Buckets?
SEE OUR MODEL LF
(Load Forward)
DEMPSTER DUMPSTER
For any 1½-ton truck
NO COUNTERWEIGHT OVERHANG SIDESWAY
All the load on the chassis.
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CONTRACTORS' SUPPLY DEALERS in every state sell the Fulton line. Specify SHURE-DRY and FULTEX Tents, Tarpaulins, and Windbreaks—anything made of canvas. Also Fulton Road Mats and Burlap. Fulton products are good and their prices are right.
If your dealer can't supply you write our nearest plant for catalog, samples and price list.
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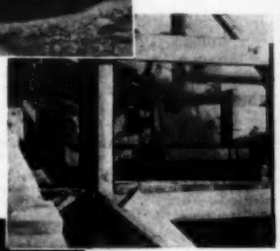
TELSMITH
EQUIPPED GRAVEL PLANT SUCCESSFULLY SERVES
Boston Market

General View Crystal Concrete Products Co. Plant

13-B Telsmith Primary Breaker crushes the large boulders to 3 to 4 inches



4-foot x 12-foot Telsmith Triple Deck Pulsator

8-B Telsmith Gyratory Crusher reduces oversize from Primary Breaker

Two of the three Telsmith Sand Tanks

● Supplying the Boston market with sand, gravel, and ready-mixed concrete—this new and completely modern Telsmith-equipped plant of the Crystal Concrete Products Co. at Braintree, Mass., is closer to Boston than any other plant of comparable size.

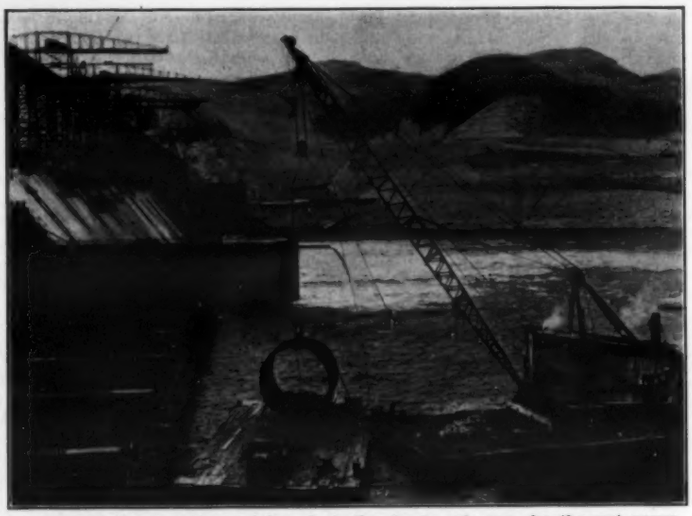
The plant's principal owner, Mr. Thomas A. Hannaford, is both an experienced and large-scale operator. The use of Telsmith equipment is doubly significant.

The bank covers about 150 acres . . . and the plant is now producing 125 tons an hour of 1½-inch and down. This is not top capacity by any means. Even in its breaking-in period the plant produced considerably more.

The equipment, in its flow sheet order, includes: 24″ Telsmith Plate Feeder; 13-B Telsmith Primary Breaker crushing large boulders to 3 to 4″ size; 30″ x 76′ Steel Frame Main Belt Conveyor; 4′ x 10′ Telsmith Single Deck Pulsator; 8-B Telsmith Gyratory Crusher crushing oversize from the primary breaker; 18″ x 79′ Steel Frame Return Belt Conveyor; 24″ x 129′ Steel Frame Main Belt Conveyor; 4′ x 12′ Telsmith Triple Deck Pulsator; one No. 7 and two No. 8 Telsmith Sand Tanks; four Duplex and three Simplex Telsmith Bin Gates, 15″ x 15″.

Like all Telsmith-equipped plants, the operation of this one has been more than satisfactory from the start. Every individual Telsmith unit does its job, with a minimum of attention and upkeep. The entire ensemble runs smoothly —*and profitably*. Planning a new quarry or gravel plant? Modernizing? *Find out* about Telsmith engineering service and guaranteed results. *Get Bulletin G-34.*

G-5-40



A penstock lining section arriving via trailer, barge and crane for the east power house at Grand Coulee. Of the many thousand feet of cable used in delivering and handling these heavy sections, practically all of it was preformed wire rope selected because of its performance records for standing up under severe service.

Welded Steel Lining In Coulee Penstocks

Huge Steel Pipe Moved by Trailer, River Barge and Other Machines: Electric Welds for Connections

(*Photos on page 40*)

✦ LAST summer one of the most interesting and ingenious pieces of construction at Grand Coulee Dam was completed with the installation of the steel linings for eighteen 18-foot diameter main-unit penstocks, three 6-foot diameter station service penstocks and twelve 14-foot diameter pump inlets. This work was carried out by the Western Pipe & Steel Co. of California, under its contract for the fabrication and installation of these linings, and represents one of the major contracts for the construction of Grand Coulee Dam and its appurtenances.

All of the linings, except the station service penstock linings, were fabricated by the Western Pipe & Steel Co. at its plant at the dam site, because the size of the sections would have prohibited transportation from outside points. The station service linings, however, were fabricated at Birmingham, Alabama, and shipped in 40-foot sections. The general scheme for constructing the penstock and pump inlet linings was to fabricate the lining in sections that could be handled, and then assemble the lining by welding the sections together in the field.

Power Development

In connection with the installation of the penstock and pumping-plant inlet linings, it is interesting to know how they are to be utilized. The ultimate power development at Grand Coulee Dam calls for the completion of a power house downstream from each abutment of the dam. The right power house will have nine main unit generators rated at 108,000 kva each, and the left power house will have three station service generators, each rated at 12,500 kva and nine main units rated at 108,000 kva. The average operating head at the turbines will be about 333 feet. The total output of the eighteen main units and three station service units will be about 1,974,000 kw.

Approximately 1,970,000,000 kw-hours of this energy will be consumed annually in the pumping plant to be built just upstream from the left abutment of the dam. This plant will have twelve pumps, each capable of pumping 1,600-second-feet of water with a 280-foot lift, to supply water for the irrigation of 1,200,000 acres of land. About 10,455,000,000 kw-hours of electrical energy will be available annually for other uses, after power has been supplied for the pumping plant.

Present plans for the power houses and pumping plant call for the construction of a foundation for the right power house and the completion of the left power house, with generators installed for two station service units and three main units. All penstock linings have now been installed, and additional generators will be added as needed. The right power house will be completed when warranted by future power demands. The foundation for the pumping plant is being built, inlet linings have been installed, and the plant will be completed with the development of the irrigation project.

Penstock Details

Provision for the installation of the steel penstock linings was made in the construction of the dam by forming 24-foot octagonal blockouts for the main unit penstocks, and 12-foot octagonal blockouts for the station service penstocks. At the upstream end of the blockout, one section of the penstock lining containing a hemispherical bulkhead was installed by the general contractor. A formed intake transition at the upstream face of the dam connects with this section. The hemispherical bulkhead was provided to keep water out of the penstock until ready for use, and is necessary because the main penstock bulkhead gates are not yet installed.

The pump inlet linings were set in place and concreted directly as the pumping plant foundation was built. They have formed-intake sections similar to the penstock intakes. Hemispherical bulkheads were installed on the lower ends of the pump inlet linings.

The tables on page 34 show comparative figures for the various linings.

Sections of the main unit linings weigh up to 48 tons. An elbow section at the lower end of the main unit linings reduces the penstock diameter to 15 feet. All of the linings are made of steel plates of firebox quality, conforming to the American Society for Testing Materials Specification No. A-89-33. Minimum strength requirements for these plates are 50,000 pounds per square inch tensile strength, with a 27,000-pound per square inch yield strength, and 31 per cent elongation in 8 inches.

Penstock Lining Installation

The lining sections for the east abutment penstocks were delivered on a

(*Concluded on page 34*)

JAEGER Builds the MODERN HOIST

● FINGER-TIP CONTROL of Loads up to 100 H.P. thru Giant Expanding Frictions or Clutches.

● ANTI-FRICTION BEARINGS, replacing babbitt or bushings on all heavy duty models.

Combined All-Steel Side Frames and Base (50% stronger, hundreds of pounds lighter). Smoother Power, Silent Chain Drive. Sizes 6 to 100 H.P., Gas or Electric, 1 to 3 Drums.

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Get the "low down" on the Rex design and Rex quality that have "sold" themselves to thousands of experienced contractors like yourself!

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Rex 28S—56S Mixers . . No. 363

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Enclosed is my remittance of $2 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

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N. B., A two dollar bill, check or postage stamps will be entirely acceptable.

Grading with Scrapers On Minnesota Project

(*Continued from page* 11)

Nearby on another trailer was a Lincoln electric welder with an International engine on the outside to run the welder. Mounted inside the housing with the electric welder were brackets for holding the tanks for acetylene cutting and welding.

The office was an example of completeness and comfort, with a file at the door, opposite it a bureau for the Superintendent's personal use, and a very comfortable bed. Tucked behind the bed and accessible by a door from the front as well as the back of the trailer was a very complete parts storage for the more costly parts, spare carburetors, etc.

Running the Job

With the slightly undulating character of the country through which this job ran there was a very large amount of overhaul, as listed above. The cuts were small and long, and the fills equally strung out and low. The entire excavation and fill was handled with three 12-yard LeTourneau Carryalls pulled by RD8 Caterpillar tractors and an Allis-Chalmers LO tractor pulling a Davis bottomless hydraulic scraper. This was used in the tight places where the larger Carryalls could not operate. The big scrapers were used for all the slope cutting and ditches as well as the regular grading. Where there was some dirt to be rustled around, the LeTourneau bulldozer on an RD8 was always ready to do the hustling. In accordance with state specifications, a sheepsfoot roller was kept moving over all the fill but the solidity of the packing by the tractors and the big tires of the Carryalls was demonstrated by the fact that the feet of the roller "rode high" practically all the time.

The contractor saved all the top soil by stripping with the Carryalls and stockpiling as close to the sites where he would have to use it as possible. This was used for dressing the slopes.

Nico corrugated iron culverts were used throughout this job, furnished by the Continental Steel Co., of Kokomo, Ind. The larger culvert pipe was all concrete furnished by the Concrete Products Co. of New London, Minn., and when installed each joint was wrapped with building paper.

The gravel surfacing for stabilizing the top of the new grade was hauled in a maximum of 2 miles from the end of the job, making a maximum haul of 8 miles. The sub-base and cushion course was bladed to the correct section with a No. 11 Caterpillar Auto Patrol.

Personnel

Wm. Collins & Son, contractor for this 7.6 mile grading project, is a member of the Associated General Contractors of America. On this job W. J. Hjerpe was Superintendent, and H. W. James was Project Engineer for the Minnesota Highway Department.

Three Catalogs on Convertible Excavators

Three catalogs, Nos. 25B, 18B and 65C, have recently been issued by Bay City Shovels, Inc., Bay City, Mich., describing its Model 25, 18 and 65 convertible excavators. Model 25 is a small, ½-yard shovel or 5-ton crane. Model 18 is a heavy-duty truck-mounted crane,—according to the manufacturer, the biggest crane on pneumatic tires—and may be furnished on new or used heavy-duty 3-axle trucks having a gross rating of 50,000 pounds or more. Two types are available, the Standard which has a lifting capacity of 16½ tons and the Special which provides for the handling of heavier loads, higher lifts, longer reach and a greater capacity of 20 tons. Model 65 is a heavy-duty 1¼-yard convertible shovel with a 20-ton crane rating.

Each catalog gives complete data on the machine it covers, including specifications and working ranges for shovel, dragline and trench hoe, and is fully illustrated with action photos and working drawings. Copies of any one catalog or all three may be obtained by writing direct to the manufacturer and mentioning this magazine.

New Wellman Dist. Sales Mgr.

The Wellman Engineering Co., Cleveland, Ohio, has announced the appointment of G. S. Swanson as Cleveland District Sales Manager of Williams clamshell and dragline buckets.

IF YOU have a tough hauling problem—check with LA CROSSE for a trailer of the right size and type to fit the job. LA CROSSE builds the most complete line of heavy duty trailers—in a wide range of capacities for every hauling need. Built to take the heaviest loads safely. Write for complete information.

La Crosse Trailer & Equipment Co.
La Crosse, Wis., U. S. A.

THE LARGEST TRAILER IN THE WORLD IS A LA CROSSE !

142 CLASSES OF SPECIALIZED LUBRICANTS have been developed in Sinclair refineries to meet the exacting requirements of modern industrial equipment. For *road construction machinery* . . .

. . . SINCLAIR OPALINE and SINCLAIR PENNSYLVANIA MOTOR OIL stand up under rigorous operating conditions. These and other Sinclair lubricants and fuels promote continuous operation of all types of road building machinery at low upkeep expense. For quick deliveries of Sinclair fuels and lubricants, write the nearest Sinclair office or to Sinclair Refining Company, 630 Fifth Avenue, New York, N. Y.

* * *

(Right) **DUMP TRUCKS** *of J. W. Conner & Sons, Tampa, Fla., operating on the Taft (Fla.) to Osceola County line highway project. Sinclair products used exclusively for all equipment.*

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

SINCLAIR LUBRICANTS-FUELS

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Varied Operations In Hennepin County

(*Continued from page 2*)

January 1 of odd years and then, acting as a County Board, appoint the County Engineer as of May 1. A new County Engineer in Minnesota is appointed for a one-year term and thereafter for two years. W. E. Duckett, County Engineer, has held that office in Hennepin County for 12 years and prior to that was County Engineer in Wright County for 5 years.

Four of the Hennepin County Commissioners are from Minneapolis and one from the county outside of Minneapolis. They act as an Advisory Board, leaving to the County Engineer the management of the County Highway Department and the preparation of specifications for equipment and material. Don G. Felcher is Assistant County Highway Engineer, spending most of his time in the field, and is in responsible charge of construction and maintenance. Formerly this work was done mostly by contract, but for the past few years has been handled by day labor, using relief labor with the regular county employees and county equipment.

Equipment

The county garage and shop are located at Hopkins, which is near the center of population of the county. Crushing and screening plants, operated with WPA labor, are located at Osseo, Hanover and Minnetonka Mills, where gravel is stockpiled for summer use. This work was formerly let by contract and the aggregate hauled away by the county from the pits.

The major equipment owned by the county includes:

1 1,000-gallon oiler on GMC truck
2 1,000-gallon Etnyre distributors
1 1,000-gallon Rosco distributor
1 complete gravel plant with loader, bucket elevator, bins, screens and Worthington engine
1 Packard truck
1 Willis truck
1 International 1½-ton truck
1 Model A Ford truck
2 Coleman 4-wheel-drive trucks
2 Chevrolet trucks
2 FWD 5-ton trucks
2 Walter 5-ton trucks
2 Ford 1½-ton trucks
2 International 2-3-ton trucks
2 Mack 2½-3-ton trucks
3 Caterpillar Sixty tractors
1 Caterpillar RD7 tractor
1 Austin roller
1 Huber roller
2 Caterpillar elevating graders (Russell type)
1 Adams grader
2 Caterpillar Super Mogul graders (Russell type)
2 Wehr graders
1 Fordson grader (Russell type)
1 Stockland grader
2 Warco Road Hog graders
3 Caterpillar Auto Patrols
14 Caterpillar pulled graders (Russell type)
5 Gallon pulled graders
4 Adams pulled graders
5 Stockland pulled graders
5 Caterpillar patrol graders
2 Bros patrol graders
1 9-foot wing snow plow
1 8-foot wing snow plow
2 V-plows for tractors
1 LaPlant-Choate V-plow for tractor
1 Wausau V-plow for tractor
1 Baker truck plow
1 Wausau V-plow for truck
2 wing plows for trucks
2 Bros V-plows for trucks
2 Gettleman truck plows
2 V snow plows
1 Gettleman snow plow
2 Sargent snow plows
6 Bros snow plows
1 Bros 1-way Snow Flyer
1 American wing snow plow
1 Sargent V-plow and wings
3 Sargent V snow plows
1 American V snow plow
1 American 1-way snow plow

Among the miscellaneous equipment are included:

2 asphalt and tar heaters
2 concrete mixers
1 Novo engine and pump
2 Gorman-Rupp pumps
1 5-ton trailer
2 ½-ton auto trailers
2 semi-trailers
1 Toro mower
4 weed sprayer
1 sand spreader

The county also has 97 miles of snow fence which it uses very effectively in preventing drifting on county roads. Inasmuch as the prevailing winds in Hennepin County are from the northwest, the snow fence is placed on the north and west sides of roads. There are times, however, when a south east wind comes up, bringing an unusually heavy snow fall, and at these times the snow fence is useless.

Financing

Funds for county highway construction, maintenance and snow removal come from three sources in Minnesota. Hennepin County has a real estate levy which brings $250,000 a year to the county highway funds. In addition it receives $36,000 annually as State-Aid. This is a State 1-mill tax prorated to every county so that each county receives at least one per cent of the total, and the three largest counties, Ramsey, St. Louis and Hennepin, each get an additional 3 per cent. The remaining 4 per cent, there being 87 counties in the state, is divided among the small counties as needed to supplement their meager funds. The third source of county highway money is the State gas tax, one-third of the total receipts being prorated to the counties on the basis of mileage and area, but the law requires that each county receive at least 0.075 per cent and not more than 3 per cent. Hennepin County received $169,000 from this source last year.

Road Construction

As will have been noted at the beginning of this article, most of the surfacing in Hennepin County is a bituminous mat brought about by oiling. This is done with its 1,000-gallon distributors and fleet of four 1,000-gallon supply tanks mounted on trailers so that the distributors can remain on the job while the supply tanks haul out the road oil. For many years the county used a very light asphaltic oil as a dust layer, but as this continued season after season a bituminous mat was slowly built up. Later, as heavier oil was used, the bituminous mats have increased in thickness so that they now average 1½ inches thick and some up to 4 inches of penetration.

On the older roads it was the custom to scarify the surface before each oil application so the result has been really a base stabilization. Recently a Seaman triple-tiller, which kicks up the material much like a lime cultivator, has been purchased. This is used after the road has been prepared with a shot of ¼ gallon per square yard of the bituminous material, which is covered with 6 to 8 inches of the road aggregate and then shot again with a ¼-gallon application. Running the triple-tiller through this mixes the material very thoroughly, but usually a third application of ¼ gallon is applied before the material is sufficiently coated. Formerly a 70 to 80 asphaltic road oil was used, but lately the county has used chiefly an SC-6 or an MC-2 asphalt. Tar is used for patching, having formerly been sprayed or swabbed on the pot holes, but now a tar-mix is being stockpiled for cold-patch work and this type of maintenance was continued on a considerably larger scale during 1940.

Snow Removal

When it comes time to fight a Minnesota snow storm, the snow plows on trucks and tractors are scattered out, radiating from the county garage at Hopkins. To supplement the equipment mentioned in the list, 13 additional trucks and tractors are rented from individual owners, and stationed at strategic points throughout the city and county. Most of these are equipped with county-owned snow plows. One Caterpiller Sixty with a LaPlant-Choate V-plow is stored in a foreman's yard in the northeast section of the county. The man is a grader operator in summer.

In radiating out from the county garage to open up all the county highways, it is sometimes necessary for equipment to travel over state routes which have been plowed by the state, but this only speeds up the movement of the county-owned equipment to the farthermost corners of the county. Consideration has been given to the establishment of county garages, but with the size of the county and the effectiveness of the organization, it has been thought better to concentrate all of the equipment, with the few exceptions mentioned, at the main county garage in Hopkins.

Catalog on Welding And Cutting Equipment

Oxyacetylene welding and cutting equipment and a-c arc welders are described and illustrated in a complete general catalog recently issued by the Smith Welding Equipment Corp., Minneapolis, Minn. Featured in this catalog is the Type J 2-stage portable acetylene generator which, according to the manufacturer, incorporates outstanding improvements in generator design, such as perfect regulation of outlet pressure, complete circulation of all water in the generator and additional cooling and radiation surface. Sizes, weights and prices of all welding and cutting equipment and welding accessories in the Smith line are given and each item is well illustrated.

Copies of this catalog may be obtained direct from the manufacturer by mentioning this item.

New Robins Adv. Manager

Robins Conveying Belt Co., Passaic, N. J., has announced the appointment of Alfred S. Otton as Advertising Manager to succeed the late William L. Fewsmith. Mr. Otton will be assisted by E. E. Riches and John M. Lupton.

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Manufactured in 2, 5 and 15-Ton Sizes.
For capacity comparison, ½" cable used:
2-Ton "Lightweight" ..... 75 ft.
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15-Ton Triple-Geared "Special" ....1200 ft.
Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price, f.o.b. Seattle
2-Ton 4, & 22 to 1	60 lb.	$ 50
5-Ton 4, & 24 to 1	110 lb.	$ 75
15-Ton 4, 19 & 109 to 1	680 lb.	$250

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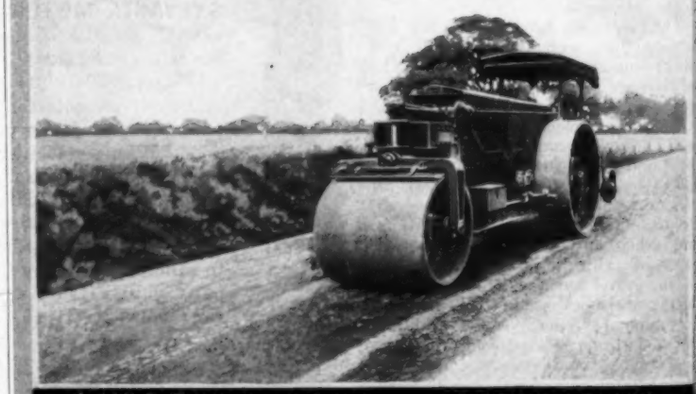


3-AXLE TANDEM ROLLERS TANDEM ROLLERS
3-WHEEL ROLLERS TRENCH ROLLERS
THE BUFFALO-SPRINGFIELD ROLLER CO.
SPRINGFIELD, OHIO

A COMPARATIVE JOY RIDE

Photo by Courtesy of the Sterling Motor Truck Co.

THE Harrison Construction Co. of Pittsburgh finds the speedy movement of this monster Lorain shovel on their Trailer a joy ride in comparison with older methods or less advanced equipment.

ROGERS' TRAILER

This completely electrically welded trailer is thoroughly engineered to withstand every possible strain including terrific overhanging loads like this one.

Four rear axles oscillate longitudinally and transversely to distribute the load over sixteen tires and Patented equalizing brakes afford safety of control under all conditions.

There is a Rogers trailer for every requirement.

ROGERS BROTHERS CORPORATION
108 Orchard St. Albion, Penna.
EXPERIENCE builds them PERFORMANCE sells them

Resurfacing Concrete On du Pont Boulevard

Extensive Contract Awarded To Old Line Const. Co. for New Paving, Widening and Patching, With Resurfacing

(*Photo on page 40*)

✦ COLEMAN DU PONT Boulevard runs south from Wilmington, Delaware, for a distance of nearly 100 miles and is now a dual highway with a wide center grass area for the first 45 miles. Today this is one of the leading super-highways in the United States with its wide center grass area and attractive landscaping. The first concrete roadway on this boulevard was laid 17 years ago, 16 feet wide with a 6-8-6-inch section. Five years later this was widened 4 feet and now, to make this section fit into the newer portions which have been built, it is widened another 2 feet and resurfaced with a 2-course asphalt pavement.

The contract for 7.54 miles of this work between Odessa and Blackbird, Del., was awarded to the Old Line Construction Co., of Chestertown, Md., on its low bid of $142,837.40. The resurfacing operation was subcontracted to George & Lynch, of Dover, Del.

The Widening Operation

To prepare the trench for the 2-foot concrete widening along the entire length of this contract, a scarifier was first pulled through the widening trench to loosen the earth. It was then cut out by a pulled grader with a special 4-foot cutting plate attached to the regular blade and extending 9 inches below the blade. This cut the trench to between ¼ and ½ inch above the grade so that when a steel grade board pulled by mules was run through the trench it took off the last thin layer of material and left the subgrade undisturbed. Standard steel road forms were set on the outside and securely staked before the concrete was poured. A Koehring 27-E paver was run along the old concrete, mixing the material for the widening and delivering it to the prepared trench through a chute. One batch from the paver poured 18 feet of widening strip. No reinforcing was used in the widening strip which was finished rough by scratching with a broom. The production on this work amounted to about 5,000 feet of 2-foot widening strip 9 inches deep in 8½ hours.

Patching and New Pavement

Where the old concrete road showed signs of disintegration the concrete was removed to a depth of 8 inches and filled with new concrete hand-tamped and scratched to roughen it in order to furnish an adequate bond between it and the asphalt resurfacing. This work was all done with the road paver running over the old concrete, going from patch to patch, and resulted in a production of about 150 cubic yards of concrete for patching in an 8½-hour day. Production was somewhat slackened because in many cases concrete widening and patching were done on the same day, dividing the time between the two operations.

C. & E. M. Photo
The 2-foot roughened concrete-widening strip before resurfacing with two-course asphalt pavement.

About 3,426 feet of new concrete pavement, uniformly 8 inches thick with 59.43 pounds of fabric reinforcement per 100 square feet, was also laid, replacing old concrete pavement. In this work expansion joints were placed 120 feet apart with dummy joints at 40-foot intervals. The fabric reinforcement consisted of No. 4 gage rods transversely and No. 2 gage rods longitudinally with a 6 x 12-inch mesh. As the pavement was laid in two 11-foot slabs, the specifications required 4-foot tie bars of ½-inch round deformed bars placed 5 feet on centers with 2 feet in one slab and the bar bent so that it could be straightened to tie into the second slab.

There were also a number of sections of new concrete base of 8-inch thickness in which crack-control joints were placed on 15-foot centers. These joints have no reinforcing dowels but are formed by pushing a cutter bar into the fresh concrete to form a groove 4 inches deep into which folded tar paper is inserted. This base was also surfaced with the cold-laid asphalt pavement.

Asphalt Resurfacing

The subcontractor, George & Lynch of Dover, Del., hauled the Amiesite base and top courses from Townsend, Del., a distance of 2 miles dead haul to the center of the job. The material was dumped into the hopper of an Adnum Black Top Paver which spread a 2-inch layer under the rolls of the paver. This was finally compacted to a 1¾-inch base course. Two men operated the machine, one of them frequently spraying the screed with fuel oil from an insecticide sprayer to prevent sticking of the asphaltic mix to the screed. As the machines spread only 10 feet wide and the widened pavement is 22 feet wide, the 2 feet next to the center parkway was resurfaced by dumping the material on an iron sheet and shoveling it to the 2-foot edge where it was raked by hand and then rolled with a 10-ton Buffalo-Springfield tandem roller at the same time the material laid by the paver was rolled.

Particular care was taken in straight-edging the base in back of the spreader and filling in any low spots before the roller compacted the material. Then any holes behind the roller were filled with the top material and bumps were cut off immediately. Two straight-edges were used when spreading and rolling the top material. The final operation was covering the top course with screenings which were broomed and rolled to fill the surface voids.

The specification for the base material was 1¼-inch to No. 4 mesh aggregate with 3.5 to 3.9 per cent of asphalt binder, 0.5 per cent lime and 0.4 to 0.8 per cent liquifier. For the top course the aggregate was graded from ½-inch to 20-mesh material with 5.0 to 5.65 per cent asphalt, 0.5 per cent lime and 0.6 to 1.0 per cent liquifier.

The production on the Amiesite base and top in 10½-hour working days was 400 tons of base per day or 275 tons of top.

Personnel

For the Old Line Construction Co. of Chestertown, Md., Parks Goodnight was Superintendent throughout the work, and Theodore Pyle was Division Engineer for the Delaware State Highway Department.

Many Improvements On New Dodge Diesel

Important mechanical improvements and numerous changes to provide increased comfort and safety are incorporated in the heavy-duty Dodge diesel truck for 1941, according to an announcement by Dodge Division, Chrysler Corp., Detroit, Mich. In addition, these new models retain all the proved diesel-power features of the 1939 and 1940 models.

One of the improvements is an auxiliary 6-volt generator to operate all lights, both truck and trailer, instruments and dual horns. This generator, combined with the new sealed-beam headlights, results in improved lighting and greater safety. The 24-volt primary generator and 24-volt starting motor provide fast starting under all weather conditions.

The engine is a full diesel and has a brake hp of 100 at a governed speed of 2,600 rpm. The cooling system has been improved and includes full-length water jackets, by-pass thermostat, water temperature gage on the instrument panel, and a 4-inch fin and tube radiator core. A new safety feature is a 10-inch brake-booster cylinder and 1,000-cubic inch vacuum reserve tank for better braking. Hydraulic equal-pressure brakes assure safe straight-line stops, and a drive-shaft-type hand brake operates on the drum at the rear of the transmission.

Marvel Opens Sales Office

Marvel Equipment Corp., Chicago, Ill., manufacturer of tar kettles, concrete vibrators, grinders and breakers, has announced the removal of its sales office from the factory to 224 South Michigan Avenue.

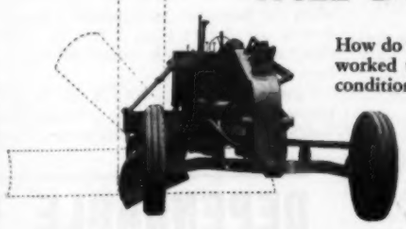
"ETHICS"

"FLEX-PLANE" finishing and joint installing machines are backed by honesty without misleading statements.

Every worth-while feature is found in "FLEX-PLANE" equipment, plus exclusive features—greater adjustability, sectional screed, tapered screed wings, etc.

FLEXIBLE ROAD JOINT MACHINE CO.
WARREN, OHIO

WE KNOW THIS BLADE WILL DO THE WORK



How do we know it, you may ask. We have worked these Galion graders under every condition on our own proving grounds . . . we have seen them in operation in the field and we are getting letters every day telling us that the blade on Galion No. 101 and 201 motor graders will go into every position with ease and at will.

This full reversible blade permits adjustment to every angle . . . for flat-bottom ditching, forming V-shaped ditches, trimming shoulders, bank cutting, and for working in reverse gear when necessary. One man can do all the work. Let us tell you more about Galion graders and what they can do for you in real blading work on your next job.

The Galion Iron Works & Mfg. Co.
Galion - - - - Ohio

No. 201 motor grader (right) in bank-cutting position. Can be equipped with 50 HP diesel or 40 HP gasoline engine—single or double drive. Bulletin No. 254. Also write for Bulletin No. 253, which covers the No. 101 unit with 35½ HP diesel or 44 HP gasoline engine.

Motor graders
Pull graders
Rollers
Spreaders
Blades

C. & E. M. Photo

Bulk cement was batched by this Hercules-powered Blaw-Knox plant while the special cements were batched by hand.

Color on the Highway Feature of Ky. Job

(*Continued from page 2*)

men were responsible for dumping the trucks of aggregates as they were delivered to the stockpile; there was one man for each batcher; and a man operating the crane. At the cement-batching plant, one man operated the plant while another took care of spotting and unloading the cement cars. As the batch trucks came to the cement batching area, they first stopped at a box car, where two men put in two bags each containing 63 pounds of natural cement, the proper amount to give the ratio of one bag of natural cement for each five bags of portland cement in the batch.

Water for sprinkling the subgrade ahead of the paver, for mixing mortar for the batches and for sprinkling the concrete during the curing period, was supplied by a Gorman-Rupp triplex pump delivering the water to a 3-inch line 5 miles long laid along the shoulder and then reducing to 2½ inches for the needed extension to the site of paving.

Preparing the Grade

The large amount of clay in the soil in this area caused the ground to pack very solid so that it frequently happened that the subgrade had to be scarified by a Lakewood rooter before the rough grade could be completed. This was followed by a Caterpillar Fifty diesel tractor pulling an Adams No. 121 leaning-wheel grader with a 12-foot blade. Immediately ahead of the forms, a Caterpillar Auto Patrol with a 12-foot blade left a finished grade. Then, seven men with a boss form setter and helper prepared the form trench and set the forms. Over these, the power grader pulled a Lakewood subgrader, leaving the windrows of earth cut from the subgrade to be cleaned out by six men in the fine grade crew behind the subgrader. A Lakewood mechanical form tamper was used to insure a firm foundation under the 9-inch base of the 9-inch deep Blaw-Knox steel road forms. A foreman and three men, back of the fine grade crew, did any further necessary tamping under the base of the forms and aligned them. A man operating a 7-ton Buffalo-Springfield tandem roller, which came behind the first template, was also responsible for oiling the forms in his spare time from rolling. Just ahead of the paver, one man who cleaned out the dirt against the forms, particularly against the previous poured slab, was also responsible for keeping the grade wet, using a sprinkler hose attached to the main water line.

Steel, Joints and Paving

Inasmuch as the Koehring dual-drum paver ran on the subgrade between the forms, no steel could be placed on the subgrade until after the paver had pulled ahead with the heavy blade subgrader attached to it by a pipe, and immediately behind this, a checking scratch template. Two men cleaned out in front of the cutting blade and also removed the dirt which was spilled against the forms by the blade.

Expansion joints on this contract were spaced 120 feet apart with one contraction joint between. Bethlehem Steel expansion joints, with a 1-inch cane-fiber expansion material impregnated with asphalt through which nine sheet-metal load-transfer units were carried for an 11-foot slab, were used. The load-transfer units were oiled on one side and covered at the ends on that side with caps also oiled, and a 1½-inch equal-leg cap was placed over the top of the impregnated fiber expansion material and oiled.

The contraction joints are the same as the expansion joints but with no fiber expansion material and with no caps on the ends of the load-transfer units. A strip of felt 2 inches wide and ¼ inch thick was inserted by the finisher over the center of each contraction joint to create a plane of weakness at that point.

Immediately behind the scratch template, pulled by the paver, four strips of subgrade felt were rolled out. The two men shoveling from the subgrader blade unrolled the outside rolls and the puddlers spread the two inside rolls. As soon as this was completed, one man straightened the dowels or tie bars cast in the initial slab in a notch formed by a steel plate set against the road form when the first slab was poured. These dowels are 4 feet long, 2 feet in each slab, and are ½-inch round deformed bars.

Two men working outside the forms handed in and assisted in placing the welded fabric mats for reinforcing the slab. They were placed with a 12-inch lap.

The batch trucks backed up to the skip of the dual-drum paver and were dumped by a man who used a sledge on the body after dumping each batch to insure a clean dump of the cement. The Koehring dual-drum paver handled two batches in 1 minute and 10 seconds, the 10 seconds being allowed for transfer of the batch from the first to the second drum. Two pit men or puddlers helped spread the concrete for the 11-foot slab and then a heavy strike-off, pulled by the paver winch, cut the concrete 2 inches below the top of the forms. The welded reinforcing fabric mat was then placed on the struck concrete. The strike-off carried a Lauson engine driving a Jackson Vibrospade which was used against the forms on both sides and across all joints.

The 11-foot slab is 9 inches thick at the edges, reducing to 7 inches uniformly in 2 feet and then continuing the 7-inch thickness across the entire slab, while the 22-foot slab is 9 inches thick at both edges reducing to 7 inches uniform thickness 2 feet from each side. The paving outfit, which operated a 12-hour day with two 6-hour shifts, averaged 2,000 feet of 11-foot slab per day with a "best day" of 2,100 feet, while on the 22-foot slab the average run was 1,500 feet.

Finishing, Color and Lip Curb

Two men worked in front of the first screed of the double-screed Blaw-Knox gas-electric finishing machine which ran either on the two forms for the 22-foot slab or on the slab at one side and the road form on the other side for the 11-foot slab. This was followed by a Koehring longitudinal finisher operated by one man.

Hand finishing was done by one man with a 10-foot aluminum drag straightedge which later was used for checking and then one man edged the slab just

(*Concluded on next page*)

Concrete VIBRATORS
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Write for Circular on types, sizes and prices
White Mfg. Co.
ELKHART INDIANA

NOT ONE CENT FOR REPAIRS *in* 17 YEARS!

Every working day, for 17 years, a Williams ¾ Yard Bucket has been unloading crushed rock and sand from railroad cars for the Concho Sand and Gravel Co., Oklahoma City. In all that time of heavy duty service, not one penny has been paid for repairs or maintenance. Now a set of pins and bushings is being shipped to start the bucket, as good as new, on another seventeen years of service.

Williams Buckets and Parts are stocked by distributors in all sections of the country.

Send for free bulletins covering Williams Buckets for all types of service.

Now WELDED Rolled Steel CONSTRUCTION

THE WELLMAN ENGINEERING CO., 7012 Central Ave., Cleveland, Ohio

WILLIAMS *Buckets*
***built by* WELLMAN**

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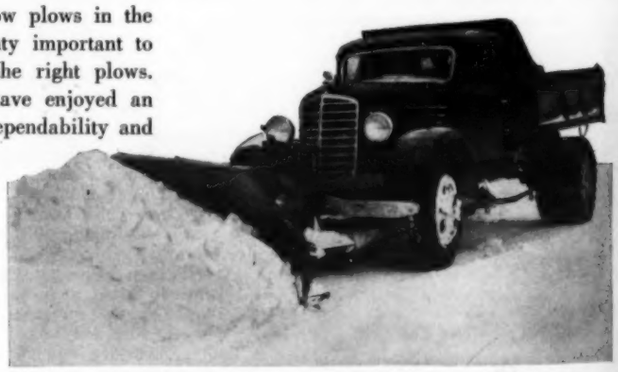
You wouldn't think of changing snow plows in the middle of a blizzard. So it's mighty important to know in advance you are getting the right plows. For 32 years Baker Snow Plows have enjoyed an enviable reputation for sturdiness, dependability and economical performance. Bakers will never let you down. The new line of Baker Truck Snow Plows includes many improved models in "V", reversible blade and one way types for any motor truck.

Send for attractive new Bulletin 829 on Truck Snow Plows—also special bulletins on tractor plows.



A Baker Reversible Blade Snow Plow doing a clean job by getting right down to the pavement surface, thanks to the Baker Sectional Tripping Blades.

THE BAKER MFG. CO., 585 Stanford Ave., Springfield, Illinois

BAKER SNOW PLOWS

Coloring and Curing On Fort Knox Highway

(Continued from preceding page)

ahead of two men who hand-cast the metallic red oxide over the surface at the rate of 30 pounds per 100 square feet of concrete surface. This was followed by two men with 5-foot x 6-inch long-handled floats with a sheet-metal strip on the bottom who floated the red oxide into the surface of the pavement, insuring a uniform distribution. The joints at the expansion and contraction strips were cut and the cap removed and the strip set in the contraction joint slot ahead of spreading the oxide. Behind the oxide came the regular joint finisher and then one man who gave the final transverse broom marking to the slab surface, using a 2-foot fiber broom.

Lip curb was built at both edges of the pavement on all grades of 1½ per cent or more. The standard lip curb in Kentucky is 3 inches high and 8 inches wide at the pavement surface. It is put in with a 3-inch form and built by hand, using two men hauling back concrete from the paver in a rubber-tired wheelbarrow and then two men building the curb with the one man placing the forms ahead, and cleaning them.

Curing Methods

Immediately behind the broom marking, two men spread burlap which had been strung along the adjacent slab or on the shoulder and dampened transversely across the slab. Following them, one man sprinkled the burlap, keeping it wet until the next morning or approximately 24 hours from the time it was spread. As soon as the burlap was removed the pavement was given a thorough wetting and rolls of Sisalkraft water-proof paper, 60 feet long and rolled on 2 x 4's for convenience in handling, were unrolled over the entire surface and sealed at the edges with dirt. This paper remained on the pavement for 72 hours to complete the curing by maintaining a moist surface against the slab to prevent hair checking, and to secure the maximum strength in the slab surface.

Personnel

The contract for Federal Aid Project 79D (2) (S), 8.71 miles in length, was awarded to F. C. Gorrell & Sons of Russellville, Ky., on its low bid of $277,408.43. For the contractor, the work was in charge of B. H. Gorrell as Superintendent, and Dewey Sparks was Resident Engineer for the Kentucky Department of Highways.

New Car-Washer Hose

A feature of a new car-washer hose with many applications in state and county garages and contractors' field shops is the cover of high-grade synthetic rubber designed to withstand oil, grease and general abrasion encountered in this type of service. The construction of the hose in other respects involves the same high-grade tube and pressure-resisting carcass used in car-washer hose previously made by the New York Belting & Packing Co., 1 Market St., Passaic, N. J.

This new hose, known as Magic, is produced in ½ and ¾-inch sizes. Outside diameters are 1 1/32 and 1 9/32 inches, respectively. The working pressure of each is 500 pounds.

STERLING No. 3 CONCRETE CARTS

STERLING No. 3 CART

This cart can be furnished with pneumatic tires

30" or 36" dia. wheels, 6 cu. ft. capacity, 14 gauge tray, underslung heat-treated axle, plain or roller bearings.

A COMPLETE LINE OF STERLING WHEELBARROWS AND CONCRETE CARTS

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A Madsen 3000 lb. Plant recently produced 904 tons per 8-hour day for 55 consecutive days. A State record for this size plant. On asphaltic concrete? Of course! This plant is moved frequently and its owners are one of the most successful contractors in their state. They own a Madsen Plant because it is a dependable producer, most portable and an economical plant to operate.

You will want to know more about this equipment.

MADSEN IRON WORKS

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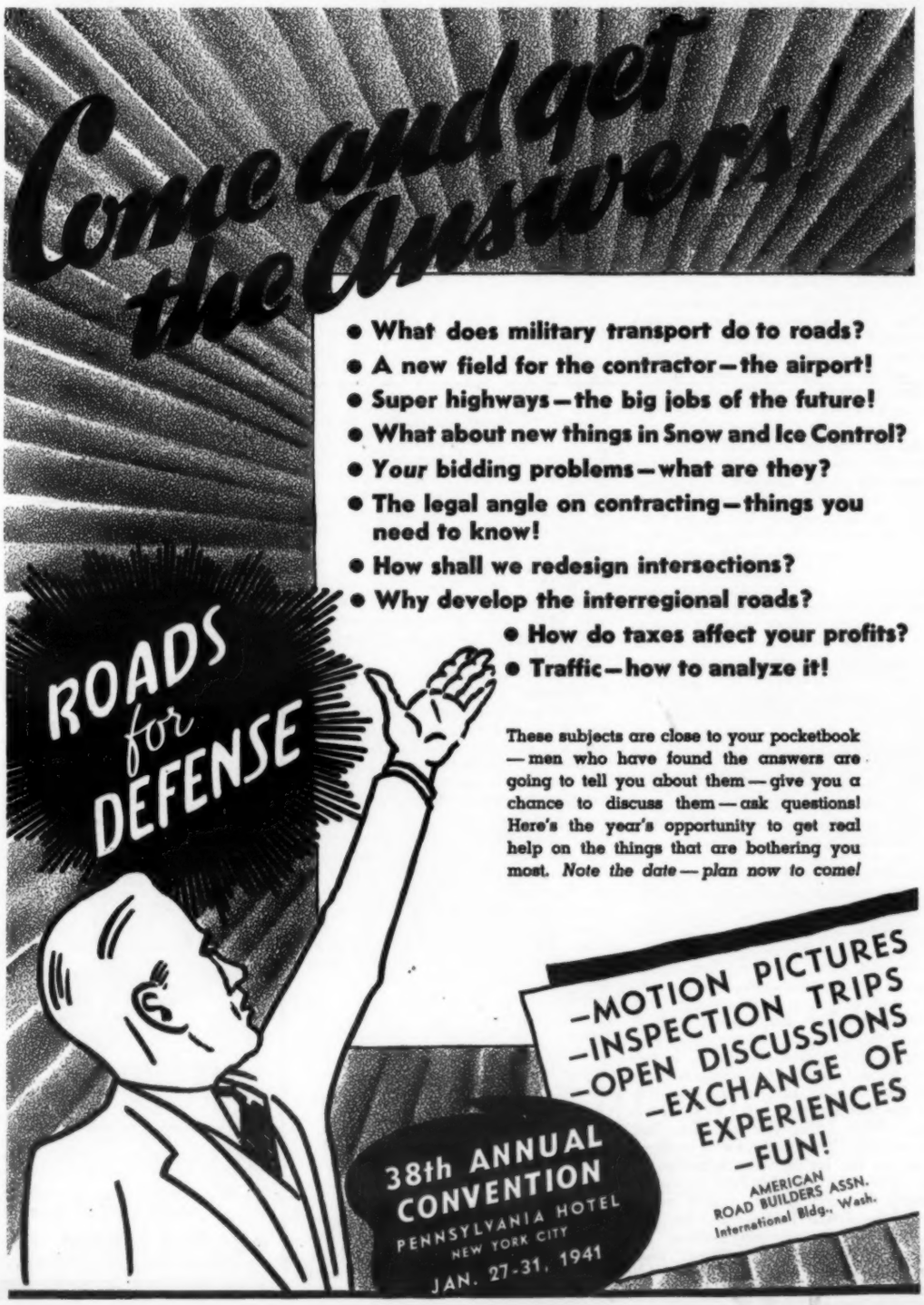
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International Bldg., Wash.

A penstock blockout for one of the 18 main units, showing the track laid for the carriage used to move the steel liner sections up into the blockout.

Placing the Lining In Coulee Penstocks

(*Continued from page 28*)

huge trailer to a dock on the east tailrace. From the dock, the trailer, loaded with one section, was ferried across the tailrace to the downstream side of the east power house foundation. Here the section was picked up by a steam revolving crane mounted on a large barge and transferred to a carriage at the downstream end of the penstock blockout. Linings for the west abutment penstocks were delivered on flat cars and unloaded with a traveling gantry crane in the power house. Reinforcing steel to be placed around the penstock linings was bundled and delivered on top of each section.

Equipment for moving the lining sections up into the blockouts included a two-drum electric hoist, set up near the lower end of the blockout, and a specially designed heavy four-wheel carriage, running on rails laid on the floor the full length of the blockout. The line from one drum on the hoist was reeved as an eight-part line to the upper end of the carriage, and the other hoist line was connected singly to the lower end. This hook-up made it possible to pull the carriage forward or backward. A sheave block was secured in the upper end of the blockout for the eight-part line to pull the carriage loaded with the lining section up into the blockout. Use of an eight-part line provided ample power, and gave good control of the load, making it possible to move only a fraction of an inch when required.

On the carriage, the lining section rested on four large rollers mounted in pivoted frames with hydraulic jacks under the frames. Two end rollers on the lower end of the carriage kept the section from sliding endways. As the section being installed was pulled up against the end of the section already in place, the bottom of the two sections were first fitted together. The section on the carriage was turned on the rollers until it was in line, and the jacks under the rollers were used to raise or lower the section. As soon as the bottom of the section was fitted, it was tack welded, and the top was then fitted. Hydraulic jacks held against the side of the blockout were used to align the top. After fitting the top, the sides were fitted. This was done by welding lugs on the inside of each section at the joint, leaving the lugs extending across the joint so that a steel wedge could be driven between the lug and the wall of the adjoining section. As the ends of the two sections were brought into line, they were tack welded. After the joint was fitted, the section was temporarily supported with hydraulic jacks, and the carriage was removed.

TABLE 1

Lining	Average Length of Lining Section	Approx. Length of Lining	Number Req'd.	Inside Dia.	Wall Thickness	Approx. Wt. of All Linings in Tons
Main Unit	20 ft.	280 ft.	18	18 ft.	3/4 in. to 1-1/2 in.	7,650
Station Service	40 ft.	320 ft.	3	6 ft.	3/8 in. to 9/16 in.	220
Pump Inlet	30 ft.	60 ft.	12	14 ft.	1/2 in.	470

TABLE 2

Lining	Approx. Length of Formed Intake	Centerline Elev. of Intake at U. S. Face	Centerline Elev. at Lower End of Lining	Slope of Lining
Main Unit	30 ft.	1,041	959	20° - 33'
Station Service	10 ft.	1,041	938	19° - 53'
Pump Inlet	18 ft.	1,191.75	1,177.91 at Center of Pump	9° - 28'

After a penstock lining section was in place in the blockout, structural steel supports were welded to the support ring on the section. These supports were provided at the top and bottom and on both sides. The bottom support was designed with two pin-connected joints, to facilitate slight movements of the lining. The other supports were rigid, and were put on so that they could be shimmed against the blockout walls.

As soon as a section had been properly fitted and checked for line and grade, the girth joint between the two sections was welded. The joint is a double V butt joint, and was manually welded on the inside and outside of the lining. The weld was applied in layers and peened while hot. A steel scaffold mounted on wheels was used inside of the lining for welders to work from. The scaffold was moved by an air hoist anchored to the upper end of the lining.

The welding procedure complied with the American Petroleum Institute-American Society of Mechanical Engineers' code for unfired pressure vessels. To insure consistently high quality welding, all welders had to have passed the qualification test for welders as specified in Section W-451 of the API-ASME code. The contractor was also required to make weld tests in accordance with Sections W-518 to W-523 inclusive of the same code.

After the joint was welded, it was X-rayed to check the quality of the weld. This was done with a portable X-ray machine operating inside of the lining with the X-ray films held on the outside. Lead numbers were placed under the film, and corresponding numbers marked on the lining to orient the film when developed. Any imperfections in the welded joints, indicated by the X-ray pictures, were chipped out and repaired, and then X-rayed again. X-ray tests were made in strict accordance with Section W-524 of the API-ASME code, and all X-ray films of welded joints are permanently retained by the government.

When a complete penstock lining had been set up and checked, the reinforcing steel was placed around the lining, and piezometer equipment was installed. The space between the outside of the lining was then backfilled with concrete. Pipe struts were placed inside the lining during this operation. Concreting was done by putting a bulkhead from between the lining and the blockout at the lower end of the penstock, and Pumpcreting the concrete in from the upper end of the blockout. In some cases, the concrete was pumped over 1,000 feet, and this method worked quite successfully. Each penstock required about 2,200 cubic yards of backfill concrete. Small holes previously tapped in the walls of the linings were used for pressure grouting around the lining after the backfill concrete was placed.

Pump Inlet Linings

Linings for the pump inlets were installed and embedded at the same time the concrete was placed for the pumping plant foundation. Each lining is composed of two sections, which were set up on structural steel frames and welded together. Other characteristics of the pump inlet linings are similar to the penstock linings.

Installation of the penstock and pump inlet linings was begun the latter part of 1939, and the work was completed by July 1, 1940, several months ahead of contract schedule. The work was carried out in an efficient well-planned manner by the Western Pipe & Steel Co., and rigid inspection was maintained by the Bureau of Reclamation.

Engineering Handbook

The second edition of the General Engineering Handbook, edited by Charles Edward O'Rourke, Professor of Structural Engineering, Cornell University, has recently been published. Since the primary purpose of this Handbook is to present in one volume the important fundamental data relating to all branches of engineering and to avoid any attempt to replace the more voluminous works in specialized fields, some of the more specialized sections of the first edition, such as water power plants, electric power equipment and transmission and one or two others, have been omitted in this volume and the basic sections have been expanded.

Each one of the major sections has been prepared by a specialist in that field and gives as concisely and compactly as possible the essential engineering data for that field which will be of service to the practicing engineer as well as the technical student.

Copies of this "General Engineering Handbook" may be secured by those interested direct from this magazine. Price: $4.00.

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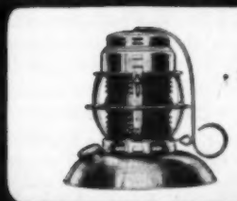

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BETTER PROTECTION
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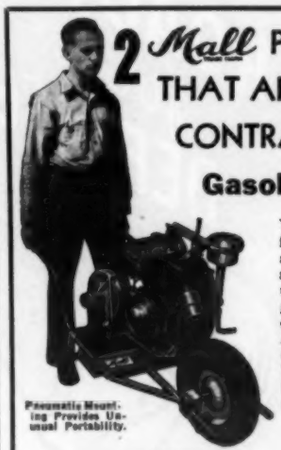
Embury Mfg. Co., Warsaw, N.Y.

2 Mall PORTABLE POWER TOOLS THAT ARE MAKING MONEY FOR CONTRACTORS EVERYWHERE!

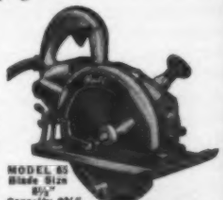


Pneumatic Mounting Provides Unusual Portability.

Gasoline Powered Vibrator

You can handle all types of concrete construction faster, with less labor, less power, less water, sand and cement and use coarser aggregates when you are equipped with this low-priced MALL vibrator that operates all day on from 1½ to 2 gallons of gasoline. It eliminates honeycombs and voids and expensive hand patching after forms are removed. A flexible shaft transmits the power to the exclusive patented vibrating unit which delivers 7000 frequencies per minute. Attachments can be furnished for Surfacing, Grinding, Drilling, Sanding, Sawing and Pumping.

LOW-PRICED ELECTRIC Mall Saw

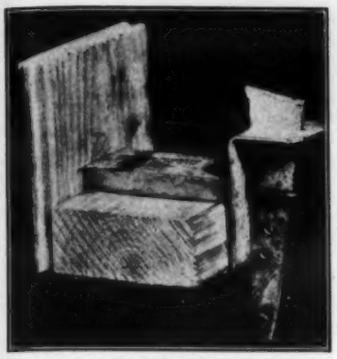


Balanced for safe, one hand use with greatest weight on long end of board. Has spring safety guard, loop handle with built-in switch and swivel base for bevel cuts to 45 degrees, 8½" blade, capacity of 2¾".

MODEL 65 Blade Size 8½" Capacity 2¾" Other models up to 4¾" capacity

Write Today for Free Demonstration of These Tools and Full Information

MALL TOOL COMPANY, 7743 South Chicago Avenue, Chicago, Illinois
OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES



Close-up of the Kanter form tie clamp.

New Form Tie Clamp

Designed to reduce the use of wales in built-in-place forms and to eliminate their use entirely in built-up sectional panel forms, the Kanter Non-Waler form tie clamp consists of three elements of galvanized metal, a horizontal 3⅝-inch length of 2-inch channel section welded to the face of a vertical plate bent into a Z shape, the bottom leg of which hooks under the form bars, studding or liners. In the face of this vertical plate is a hole ¾-inch in diameter through which passes the end of the rigid steel tie rod which is bent into a U and fitted with washers at the inside faces of the form to serve as a combination spreader and tie rod which breaks back ½ to 1½ inches from the face of the concrete. The top leg of the Z-shaped plate is slotted to receive a metal wedge which, when driven downward, passes through an opening in the bent end of the tie rod and pulls it up tight.

To strip forms held in place with Kanter clamps, it is merely necessary to knock out the wedge, remove the clamp, and twist off the protruding end of the tie rod.

Further information and samples of this Kanter Non-Waler form tie clamp may be secured by those interested direct from the Kanter Koncrete-Form & Supply Co., 3210 N. Troy St., Chicago, Ill.

Mechanical Rubber Goods

A very interestingly illustrated and informative 24-page catalog has been issued recently by the B. F. Goodrich Co., Akron, Ohio, on its line of mechanical goods. With a graphic illustration of a huge conveyor belt system as its front cover, the next two pages illustrate and describe typical examples of unusual applications of rubber. Other pages are devoted to a discussion of rubber transmission belting, together with instruction on how to splice the belting endless in the factory, distributor's warehouse or on the machine, of Goodrich's cord conveyor belt and of the many types of hose and fittings made by this company for practically every type of service, with accompanying data.

Copies of this catalog may be obtained by writing direct to the manufacturer.

Gravity and Hand Hoists and Bodies

The uses of dump bodies and the necessary hoists to make them work are many and varied on construction jobs and in state, county and township road maintenance activities. The Perfection Steel Body Co., Galion, Ohio, makes a number of styles and models to meet these various requirements.

Model 21 gravity hoist and dump body is designed for rapid dumping and has a capacity of 1½ to 2½ cubic yards. Its length is 90 inches, width 60 inches and its mounting height, 16 inches. Action is controlled by a lever located either inside the cab or outside. A pull on the lever trips the lock and the body rolls back smoothly and evenly. A second pull unlocks the mechanism and the body returns, without jar or shock, to its riding position.

The Model 20 gravity hoist is a sturdy mechanism with rocker assembly, ready to mount on any chassis frame for use with a 1½ to 2-cubic yard 90-inch body. When installed with a properly balanced body, the hoist rolls back smoothly and evenly with the load, and returns automatically to riding position when the load has been dumped. The body is locked down securely when in lowered position so that there is no possibility of accidental dumping. A feature of this hoist is the self-acting spring shock absorber which cushions the body and brings it gradually to rest at the limit of the dumping movement without jar to the truck frame or hoist mechanism.

Model 42 hand hoist and body, with a 1½ to 2½-yard capacity, is a general utility hand-operated dumping unit. The hoist has a gear reduction of 101 to 1 which dumps a 2-ton load with ease and with but 20 turns of the crank handle. The body is made of 10-gage steel and is heavily reinforced. The body subframe is a rigid structure of heavy steel shapes and is arc welded to the bottom of the body.

For hard service there is the Model A-31 heavy-duty hand booster hoist with a capacity of 2 tons and a gear ratio of 101 to 1. This hoist is furnished complete with hinges and guides, ready for mounting. Twenty turns of the crank handle will elevate the body to dumping position. Further information may be secured direct from the manufacturer.

New Air-Cooled Engine Of 11 to 22-Hp Range

The outstanding features of the Wisconsin VE-4 four-cycle four-cylinder V-type heavy-duty engine, made by the Wisconsin Motor Corp., Milwaukee, Wis., are its air cooling, Timken roller main bearings, light weight, and compactness. Because of its V-type construction, the overall length and height are kept at a minimum, and a shorter crankshaft and crankcase can be used.

Positive cooling is obtained from a large fan cast in the flywheel which forces a strong blast of air across and around the cylinders and heads. The oiling system is entirely self contained, with all parts automatically lubricated. A heavy dynamically balanced crankshaft, with unusually long connecting rods and light-weight pistons, is mounted on Timken roller bearings, front and rear. A mechanical flyball type governor provides close regulation of speed. Renewable valve seat inserts are used on both the intake and exhaust.

The VE-4 is available as a standard engine, with a side-mount tank, or as a complete power unit. Its hp ranges from 11 at 1,200 rpm to 22 at 2,600 rpm and its fuel tank has a capacity of 6 gallons.

New folders containing complete specifications on the Wisconsin VE-4 power plant may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item.

Catalog on Vibrating Screens

There are two general types of Link-Belt vibrating screens, the UP unbalanced-pulley type furnished with or without feed hopper, and the PD heavy-duty positive-drive type which is regularly supplied with steel sub-frame and with screen angle-changing mechanism. The UP type screens are used for work requiring high-speed vibration and for close sizing problems requiring comparatively small screen openings, while for the large screen openings and heavier capacities the PD type screen should be used.

The Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill., has recently issued Catalog No. 1762 giving complete information on the construction features of both types of screens and their applications. Copies of this catalog may be obtained direct from the manufacturer.

New Trucks to Nicaragua

Three new Model LM six-wheel Mack trucks have recently been shipped to Nicaragua, Central America. Equipped with 10-yard Gar Wood bodies having twin hydraulic hoists, two of these new trucks will work on the Nicaraguan section of the Pan-American Highway, now under construction, to which Thomas A. Jones of the Public Roads Administration has recently been assigned.

The third unit has been delivered to Minera La India Cia. and will be used in mining operations.

Mechanized warfare against snow on the highways is governed by the same factors that govern the use of machines in modern warfare. The only safe rule is — use the most modern tried and proved equipment — AND HAVE ENOUGH OF IT TO MEET MAXIMUM DEMANDS.

AMERICAN
Snow Plows and Wings

have proved their superiority year after year where the snow is deepest and the battle continuous.

Before you do anything on the dotted line write for Catalog No. SNP-5 and let us tell you why you get more snow plow for your money when you buy AMERICAN.

AMERICAN HOIST & DERRICK CO.
NEW YORK SAINT PAUL, MINN. CHICAGO
AMERICAN TERRY DERRICK CO.

for safe WIRE ROPE FASTENINGS
Genuine CROSBY CLIP

PREPARE YOUR PLANT . . .
FOR PREPAREDNESS WORK . .
WITH A SIMPLICITY MIXER .

AIRPORTS, CANTONMENT ROADS & MILITARY HIGHWAYS MUST BE BUILT RAPIDLY—REGARDLESS OF WEATHER

HOT MIX PLANT MIX-ASPHALT is the ONLY answer . . .

Equip your plant to meet the demand with a Simplicity Mixer, Dryer, Feeder, Tank OR A COMPLETE SIMPLICITY ASPHALT PLANT

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Interior of one of the diversion tunnels for El Palmito Dam in Mexico, showing the Blaw-Knox forms in place.

New Irrigation Dam Completed in Mexico

The Construction Department of Mexico's National Commission of Irrigation called upon equipment from the United States to aid in the construction of the recently completed El Palmito Dam in the State of Durango. This dam will store the waters of the Rio Nazas for use in extending Mexico's irrigation facilities.

For concreting the three parallel diversion tunnels, each 6 meters or 19.686 feet in diameter, 160 linear feet of Blaw-Knox three-quarter round non-telescopic collapsible steel forms were used. These were made in 10-foot sections for use in units of 40 feet, with twelve openings or charging doors in each 40-foot set-up. The travelers were so designed that the movement of the tunnel cars was not impeded while the forms were being moved or were in position for concreting. The clearance for this purpose was about 2 meters, or 6.562 feet, horizontally and 1.8 meters vertically. Each 40-foot set-up and traveler carried two sets of distributing chutes for charging concrete into the form openings.

Two B-K portable batching bins of 40-cubic yards capacity were used, and were of special design to accommodate the narrow clearance height. The weighing batchers were of 1-yard capacity and also of the three-material-in-a-line type and were equipped with clam-type bin gates having openings 12 x 18 inches, a double clam discharge gate, complete beam scales, and springless dial indicator. The gates were hand-operated.

In addition, 750 square feet of Blaw-Knox wall forms of the cantilever type were used in the spillway channel construction.

Hydraulic-Controlled Gas or Diesel Grader

The Rome No. 303 high-lift motor grader, made by the Rome Grader & Machinery Corp., Rome, N. Y., is a gas or diesel-powered unit designed for speed, performance, economy and durability in highway construction and maintenance. It has a twin I-beam boxed all-welded frame, a heavy cast steel circle, clear-vision platform, a fully-reversible blade capable of a bank-sloping angle of 90 degrees tandem drive, eight forward speeds and two reverse, and V-type scarifier. Power is furnished by a 62.5-hp diesel engine or a 62-hp gasoline engine.

Its length overall is 24 feet, its overall width 96 inches, and its wheelbase, 18 feet 9 inches. The 12-foot x 24½-inch x ¾-inch blade has a lift above ground of 15 inches and a hydraulically controlled lifting speed of approximately one inch per second. Wheels are equipped with taper roller bearings, with 7.00 x 24 pneumatic tires in front and 12.75 x 24 rear pneumatic tires.

Complete specifications on this Rome No. 303 motor grader are contained in literature which interested contractors, state, county and township engineers may secure direct from the manufacturer by mentioning this item.

State Expenditures For Highway Work

In 1939 state highway departments had a total income of $1,144,064,000 and spent $1,126,929,000, including $811,656,000 for state-administered highways, according to state reports to the Public Roads Administration. The expenditure for state-administered highways was $83,476,000 less than in the preceding year.

The states spent $467,392,000 for highway construction and $206,014,000 for maintenance, these expenditures including $575,964,000 for work on primary state highways, $57,693,000 on secondary roads in thirteen states, and $38,749,000 on urban extensions of state highways. The remaining $138,250,000 of the total for state-administered highways went for administration, equipment, highway police and interest on debt. The total expenditure for all purposes included, in addition, $134,099,000 for debt retirement, $154,085,000 transferred for use on local roads and streets, $5,147,000 used on highways not in the state system, and $21,942,000 for non-highway purposes.

Balances on hand together with the $1,144,064,000 total income brought the total funds available to $1,500,000,000. Income from current state revenue sources amounted to $850,693,000, of which motor vehicle users contributed 99 per cent. Taxes on property no longer supply significant amounts to state highway funds.

Funds received from Federal sources amounted to $189,679,000, and with income from the sale of bonds, transfers from local units, and from miscellaneous sources brought the total income from other than current state revenue sources to $293,371,000.

The total income and expenditures by states in 1939 were as follows:

State	Total Income	Total Expenditures
Alabama	$ 19,120,000	$ 18,567,000
Arizona	4,959,000	4,598,000
Arkansas	18,207,000	16,397,000
California	48,846,000	41,907,000
Colorado	13,535,000	14,623,000
Connecticut	19,362,000	20,193,000
Delaware	4,788,000	4,157,000
Florida	24,970,000	23,329,000
Georgia	19,054,000	19,597,000
Idaho	6,771,000	7,064,000
Illinois	70,078,000	68,549,000
Indiana	24,136,000	20,792,000
Iowa	23,508,000	24,239,000
Kansas	17,935,000	15,967,000
Kentucky	25,366,000	25,117,000
Louisiana	26,838,000	24,956,000
Maine	13,826,000	14,069,000
Maryland	24,975,000	18,852,000
Massachusetts	32,153,000	44,889,000
Michigan	31,552,000	34,571,000
Minnesota	25,360,000	22,412,000
Mississippi	26,999,000	29,677,000
Missouri	26,611,000	23,894,000
Montana	10,721,000	9,919,000
Nebraska	10,487,000	9,448,000
Nevada	4,274,000	4,064,000
New Hampshire	11,528,000	8,815,000
New Jersey	45,659,000	48,330,000
New Mexico	11,923,000	9,798,000
New York	78,958,000	76,861,000
North Carolina	38,137,000	35,829,000
North Dakota	5,008,000	4,558,000
Ohio	34,255,000	35,631,000
Oklahoma	11,617,000	8,915,000
Oregon	16,907,000	16,182,000
Pennsylvania	63,294,000	65,685,000
Rhode Island	7,430,000	7,934,000
South Carolina	20,116,000	17,691,000
South Dakota	6,091,000	6,685,000
Tennessee	22,556,000	37,823,000
Texas	58,442,000	60,249,000
Utah	7,198,000	11,332,000
Vermont	7,151,000	7,092,000
Virginia	27,821,000	28,118,000
Washington	24,716,000	24,289,000
West Virginia	25,504,000	24,720,000
Wisconsin	33,443,000	32,706,000
Wyoming	4,883,000	4,639,000
Total	$1,144,064,000	$1,126,929,000

Hoists and Dump Bodies

Gar Wood Industries, Inc., 7924 Riopelle St., Detroit, Mich., has available three new catalogs: No. 7 devoted to illustrations and detailed information on Gar Wood hoists and dump bodies for 1½ to 2-ton trucks; No. 16 on its line of hoists and dump bodies for Ford trucks; and No. 17 on Gar Wood hoists and dump bodies for Chevrolet trucks.

Complete construction details are given in these catalogs, copies of which may be obtained direct from the manufacturer by mentioning this item.

Two optional types of hydraulic hoists are available for this 1941 model 134-inch-wheelbase Ford truck.

New Trucks for 1941

Improvements in the 85 and 95-hp Ford V-8 engines for the 1941 line of Ford motor trucks include new bolted-on camshaft gears; valve stems still further hardened where they fit into guides; and a new location for the engine vacuum connection on the manifold riser, according to a recent announcement by the Ford Motor Co., Dearborn, Mich. Either of these engines is available in the 158 and 134-inch wheelbase conventional and cab-over-engine trucks.

Rear springs are newly designed with 12 leaves instead of 10 for greater load-carrying capacity; auxiliary springs are also new, providing more nearly equal load distribution on all right rear spring brackets. New factory-installed frame reinforcements are available at extra cost for trucks or chassis intended for exceptionally heavy-duty service with special bodies and equipment. The Shiftoguide speedometer is again included in both conventional and cab-over-engine models, indicating to the driver when to shift gears in order to obtain maximum pulling ability and economy with minimum engine wear.

There are wheelbase lengths and body models in the 1941 Ford line to meet the variety of motor truck requirements for construction jobs and for the activities of state, county and town highway departments.

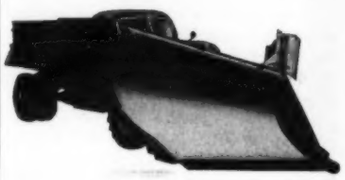
Power Hammers

Master electric or flexible-shaft-driven power hammers, for drilling ½-inch to 2-inch diameter holes in concrete and other hard materials, for cutting away concrete, vibrating, tamping, riveting and similar work, operate on a principle whereby the rotary motion of the motor is converted into blows by centrifugal action. Their operation is extremely simple, the required tool being placed in the tool socket and held there by a light spring. The hammer is then switched on and runs light without any blows being struck. As soon as the tool is pressed on to the job, a large number of powerful blows are struck, but as soon as pressure is removed the blows cease. The spade hammer is specially designed for cutting clay and similar materials, and the spade is so guided that side strain on the transmitter is avoided.

The electric-operated units weigh from 19 to 25 pounds, and consume 450 watts, 110 volts alternating or direct current, 50 or 60 cycles. The motor is equipped with 25 feet of heavy-duty extension cord and rubber plug. The flexible-shaft-driven models weigh from 17 to 23 pounds, and are powered by a 1-hp 3,600-rpm gasoline engine and 12 feet of shaft.

Form 500 containing further information on the complete range of Power Blow hammers and tools may be secured direct from the Master Vibrator Co., Dayton, Ohio, by mentioning this item.

IT'S NO SECRET



THAT ROSS plows will move more snow and do it with less power than any other. They are scientifically designed and built to PLOW, not bulldoze snow. The "Sno-Flo" moldboards used on Ross plows pick up the snow and roll it.

Ross plows are furnished for truck and tractor mounting, with or without wings and to be operated with hand or power hydraulic.

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Crestline, Ohio

Builders of Equipment for Fifty Years

YOU can DEPEND on GRUENDLER EQUIPMENT

LARGE CAPACITY Low Power Costs and Upkeep Complete Safety

Bronze or Roller Bearing JAW CRUSHERS

Heavy Armor plate steel or cast steel constructed. Large capacity. Small power requirements. Many sizes built—stationary or portable to meet your requirements.

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For All Type Roads Whether Mountain or Farm to Market or State Highway

Four Wheel Maintenance JAW CRUSHER with Power Unit.

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CONTRACTORS BARROWS with Round Fronts

Type M-11

The only barrow with tray having double folded corners and three thicknesses of steel at folds, and non-leakable

MANUFACTURERS OF: WHEELBARROWS • LAWN ROLLERS • CONCRETE CARTS • DRAG SCRAPERS • MORTAR PANS • MORTAR MIXING BOXES

Write for Catalog 40C

JACKSON MANUFACTURING COMPANY, HARRISBURG, PENNSYLVANIA

The Heitzman safety blasting plug and wedge.

New Blasting Plug Is Safety Device

The complete sealing and confinement of an explosive charge in a drill hole not only produces maximum breakage per foot of hole and pound of charge, pulls holes fully and increases fragmentation, but it also minimizes fly-rock danger and damage in open work, and in underground work produces complete combustion of the explosive and reduces fumes.

The new Heitzman safety blasting plug is an expansion stemming plug for use in drill holes in all types of blasting operations. It is made in various sizes from 1 to 6 inches in diameter and is inserted in the drill hole directly at the top of the explosive charge. The plug consists of a soft expansible thimble-shaped cup or gasket of a special incombustible material, and a conical-shaped solid wooden wedge, chemically treated, which is rammed by the tamping stick into the tapered open end of the cup to expand it and insure a snug fit against the rock walls of the drill hole. It is stated that these plugs work equally well under any weather condition, in wet, muddy or dry places, and under freezing conditions the non-deteriorating plugs are unaffected and are always ready to use.

Among the users of Heitzman safety plugs are the J. F. Shea Co. in the Baltimore aqueduct last year and currently on the Hollywood tunnel now under construction, several contractors on the Delaware Aqueduct, and a number of Government agencies engaged in blasting activities which, it is reported, have ordered these plugs in carload lots. These plugs have the approval of a number of casualty insurance companies and State Labor Bureaus.

Further information and samples of the Heitzman safety plug may be secured by interested contractors and engineers direct from the Heitzman Co., Lawson Bldg., Glendale, Calif., by mentioning this magazine.

Hand and Motor Winches

S-A hand and motor winches for lifting and pulling loads up to 3,000 pounds are described in a folder recently issued by the Stephens-Adamson Mfg. Co., Aurora, Ill. The hand hoists, ranging in capacities from 500 to 2,000 pounds of rope pull at the drum, are sturdily built, can be installed in a few minutes and not only enable one man to lift heavy loads but also have a self-locking worm gear drive to hold the load until the hand crank is turned in the reverse direction. The motor winches handle loads up to 3,000 pounds, are available in either wall or floor models and also are equipped with a self-lock worm gear drive which prevents the load from dropping when power is shut off.

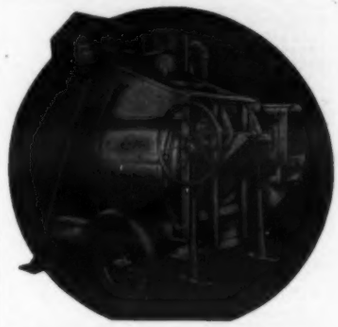
Complete data is contained in this illustrated Bulletin No. 340, copies of which may be obtained direct from the manufacturer by mentioning this item.

Power Unit Bulletin

General specifications, horsepower ratings and data on extra accessories for the line of Waukesha 4-cylinder 10 to 55-hp industrial power units are contained in Bulletin No. 830-BB. These power units, with clutch-type power take-off, are available in open or housed models, with foot or skid mounting. Extra accessories available include electric starting equipment, oil filter and governor accelerator.

Copies of this bulletin may be secured by interested contractors and engineers direct from the Waukesha Motor Co., Waukesha, Wis., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Carey Elastite EXPANSION JOINT
Standard in Concrete Construction for 25 Years
ECONOMICAL and EFFICIENT
Asphalt Joint · Rubber Joint
Non-Extruding Expansion Joint
Plate-Dowel Expansion Joint
Sub-grade Felt
THE PHILIP CAREY COMPANY
LOCKLAND, CINCINNATI, OHIO



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- AUTOMOTIVE-TYPE TRANSMISSION, 30% to 40% more efficient, quieter, longer lived.
- HIGH CARBON MACHINED STEEL DRUM TRACKS, on chilled, ground rollers.
- 65 TO 145 ALIKE IN ALL BUT SIZE—real heavy duty service in light, fast, end discharge trailers with 2 or 4-wheel mounting interchangeable. Jaeger Criss-Cross "Re"-Mix Drum, Skip Shaker Loader, fastest "Pressure" Discharge — features that have made Jaeger the world's biggest selling line.

3⅛ with Measuring Batch Hopper Mixes 30% to 40% More!

Send today for new catalog and prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

Directory of EQUIPMENT DISTRIBUTORS

The following cards (arranged by states) show the names of dealers in contractors' equipment and supplies, with a record of various lines handled.

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1402 North 19th Ave., P. O. Box 1494, Phone 3-1146, Phoenix, Ariz.

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AEROIL Products
ATECO Dirtmovers, Bulldozers, Tamping Rollers, Scarifiers
BROOKVILLE Locomotives
BROS Bulldozers, Angledozers, Snow Plows
BUCYRUS-ERIE Shovels
BUFFALO-SPRINGFIELD Rollers
CLETRAC Tractors
CLEVELAND Rock Drills
EAGLE Crushers
EMSCO Road Equipment
GAR WOOD (Isaacson) Bulldozers, etc.
KEWANEE Conveyors
SCHRAMM Compressors
SOUTHWEST WELDING & MFG. CO.
SULLIVAN MACHY. CO.
WHITE & INDIANA Trucks

GARLINGHOUSE BROS.

2416 E. 16th St. Los Angeles, Calif.

Southern California Distributors for

BROWNING—Truck Cranes, Shovels, Locomotive Cranes
DEMPSTER—Dumpsters
DIAMOND IRON WORKS—Crushers, Portable Gravel Plants
DAVEY—Compressors
LAMBERT-NATIONAL—Hoists and Cableways
McKIERNAN-TERRY CORP.—Pile Hammers
A. LESCHEN & SONS—Wire Rope
NOVO—Engines, Pumps, etc.
OMAHA—Dragline Buckets
OWEN—Clamshell Buckets
RANSOME—Concrete Mixers, Pavers, etc.
UNIVERSAL—Panel Forms, Form Clamps, etc.

Manufacturers of

GAR-BRO—Concrete Carts, Wheelbarrows, Concrete Hoppers, Buckets, etc.
GAR-BRO—Dragveyor Attachment for Draglines

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Folsom at 17th St. San Francisco, Calif.

Asroil Emulsion Distrs.
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American Concrete Grinders
Brooks Load Loggers
Byers Shovels, Cranes
Carlson Bit Grinders
Cleveland Rock Drills
Cleveland Trenchers
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Erie Rollers
Gar-Bro Barrows, Carts
Hercules Chip Spreaders
Hercules Power Units
Hough Sweepers
Huber Rollers
Interstate Tramways
Jackson Concrete Vibrators
Jaeger Mixers, Pumps, Hoists, Paving Equip.
Jones Saw Benches
Kiesler Clamshell Buckets
Kohler Lighting Plants
Littleford Wheeled Rollers
McKiernan-Terry Pile Hammers
Marion Shovels, Cranes, Draglines
Nelson Bucket Loaders
Ohio Locomotive Cranes
Page Dragline Buckets
Parts Conveyors
Ramsey Winches
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Symons Cone Crushers, Vibrating Screens
Toledo Torches
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Member: Associated Equipment Distributors

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400 Seventh St. San Francisco, Calif.

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CONSTRUCTION MACHY. CO.—Wender Mixers, Hoists
DAVIS COMPANY—Large Tilting Mixers, 1, 2, 3, and 4-yd., Weigh Batchers, Batching Plants, Manual or Full Automatic Operation, Readymix Concrete Plants and Equipment, Motor Truck Concrete Mixers and Carriers, Electricaly Operated and Controlled Water Meters, Bins, Hoppers, etc.
W. E. GRACE MFG. CO.—Road Sweepers.
HANSON CLUTCH & MACHY. CO.—Full Revolving Shovels, Cranes, Draglines, ⅜, ½, ⅝, and ¾-yd.
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Kwik-Mix Mfg. Co.—Concr. Mixers
Parsons Co.—Trench Machines
Pioneer Engrg. Wks., Inc.—Sand & Gravel Plants
Reese Mfg. Co.—Oil Distributors

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GREDAG Grease
KEYSTONE Grease
LINCOLN Grease Guns
TOLEDO Bull Frog Wheelbarrows
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JAHN Heavy-Duty Trailers
NORTHWEST Shovels, Cranes, Draglines
R-B Finegraders
GAR WOOD Hydraulic Scrapers

J. C. HOUSTON

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HOISTING MACHINERY CO.

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Lansing Concrete, Mortar Mixers, Wheelbarrows & Carts
Master Gas & Elec. Conc. Vibrators
Onan Gasoline Engine-Driven Generators
Richmond Tyscrus, Anchors
Sterling Pumps of all descriptions
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Vulcan Pile Hammers, Extractors, Parts
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OWEN Buckets
R. G. LeTOURNEAU, INC.
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SPEEDER Shovels, ½-⅝ yd.

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Sterling Mfg. Co.—Wheelbarrows & Concrete Carts
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D-A Lubricant Co., Inc.
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Goodyear Tire & Rubber Co.
Gorman-Rupp Co.
Hayes Wheelers
Iowa Mfg. Co.
Jeha-Manville (Bridge Plank)
Killefer Mfg. Co.
Kwickbocker Co.
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LaPlant-Choate Mfg. Co.
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Master Vibrator Co.
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American Cable Company
Baroo Mfg. Co.
Buckeye Traction Ditcher Company
Buoyrus-Erie Tractor Eq.
Cleaver-Brooks Company
Electric Tamper & Eq. Co.
Elgin Corporation
Euclid Road Machy. Co.
Fairbanks, Morse & Co.
Fairfield Engrg. Co.
Four Wh. Dr. Auto Co.
Frank G. Hough Co.
Gallon Allsteel Body Co.
Gallon Iron Wks. & Mfg.
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THE DAVEY COMPRESSOR CO.—Air-Cooled Compressors
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THE HEIL CO.—Power Scrapers, Bulldozers & Trailbuilders
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Foote Company—Pavers
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Hough—Tractor Front End Loaders
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LaCrosse—Trailers
McKiernan-Terry Corp.—Pile Hammers
Michigan—Power Shovels
Nelson—Bucket Loaders
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Rusco Mfg. Co.—Distributors & Oilers
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Wm. Bros Mfg. Co.—Tamping Rollers

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Bethlehem Wire Rope
Byers Machine Co.
Cleveland Rock Drill Co.
D-A Lubricant Co.
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A. Leschen & Sons Rope Co.
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Alexander Milburn Co.
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Nye Steam Pump & Machy. Co.
Oshkosh Motor Truck Mfg. Co.
Sasgen Derrick Co.
Sauerman Brothers, Inc.
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Hayward Clamshell Buckets
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Heltzel Steel Forms, Bins
Jackson Wheelbarrows, etc.
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Marsh-Capron Mixers
Miles Block Machines
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New Haven Burlapped-Cotton Blankets
Pulsometer Steam Pumps
Ransome Tr. Mixers, Agitators
R-B Finegrader
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Tru-lay Steel Cable
Union Pile Hammers
White Vibrators
Wonder Concrete Mixers

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Davey—Air Compressors
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Herculoe Company—Road Rollers
Internat'l Harvester Co.—Indus. Wheeltype and Crawler Tractors
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C. S. Johnson & Co.—Bins, Batchers, Cement Handl. Eq.
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Clyde Iron Wks., Inc.—Gas, Elec., Steam Hoists
Concrete Surfacing Machinery Co.—Berg Surfacers
Ingersoll-Rand Co.—Air Compressors, Pneumatic Tools
Iowa Mfg. Co.—Crushers, Conveyors & Asphalt Plants
Lima Locomotive Wks.—Shovels, Cranes, Draglines
Link-Belt Speed-o-Matic Shovels, Cranes, Draglines
Richmond Screw Anchor Co.—Form ties
John A. Roebling's Sons Co.—Wire Rope, Fittings
Sasgen Derrick Co.—Derricks and Winches
Shannon—Derricks and Derrick Fittings
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Sasgen Derrick Co.
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Balderson—Snow Plows
Bates—Wire Ties
Broderick & Bascom—Rope
Butler—Bins, Hoppers
Philip Carey—Exp. Joint
"Caterpillar"—Equipment
Chain Belt—Pumps, Mixers
Clyde—Hoists
Caffing—Hoists
D-A Lubricants
Bay—Crushers
Graco—Road Sweepers
H'wy Safety—Refrlc. Markings
H'way Trailer—Earthboring Eq.
Killefer—Road Equipment
Koe—Spreaders
LaPlant-Choate—Tractor Eq.
LaTourneau—Dirt-Moving Eq.
Littleford—Markers, etc.
LeRoi—Gas Engines
Manhattan—Belting
Mackwood—Pulleys
Rotary—Snow Plows
Sasgen—Derricks
Slusser-McLean—Scrapers, Fresnos
Speeder—Shovels
Sterling—Wheelbarrows
Surestep—Traffic Signs
Templeton-Kenly—Jacks
Universal—Crushers
Western Catapeltes—Signs
Wiard—Plows
Willamette Hyster—Winches
Winslow—Scales
Wood—Shovels

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Bros Tank Car Heaters, etc.
Buoyrus-Erie Bulligraders, etc.
Dubbie Derricks
Four Wheel Drive Trucks
Hough Road Sweepers, Sprinklers, etc.
Murphy Diesels
Ingersoll-Rand Compressors, Jackhammers, Air Tools, etc.
International TracTracTors, Diesel Tractors & Power Units
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Lidgerwood Hoists, etc.
Maslood Asphalt Kettles
Mall Vibrating Equipment, Saws, etc.
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Northwest Cranes, Shovels
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Crucible Steel Co.
Davey Compressor Co.
Euclid Road Machy. Co.
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Herculoe Co.
Independent Pneu. Tool Co.
International Harvester Co.
C. S. Johnson Co.
Linn Mfg. Corp.
N. P. Nelson Iron Works
Owen Bucket Co.
Pioneer Engrg. Wks., Inc.
Rusco Mfg. Co.
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Littleford Bros.
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Smith Engineering Works
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Gallon Iron Works & Mfg. Co.
Heil Co.—Wagon Scrapers
Ingersoll-Rand Company
International—Tractors
Iowa Mfg. Co.—Cedar Rapids Line
Jaeger Machine Company
Jones Superior Mach. Co.
Littleford Brothers
The Owen Bucket Company
Page Engineering Co.
Sterling Wheelbarrow Co.
Thew Shovel Company
Trenkson Company

Member: Associated Equipment Distributors

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3112-18 Harrisburg Blvd. Houston, Texas

BLAW-KNOX Road Plant Equipment, Bins, Clamshell Buckets
AMERICAN Hoisting Machinery
"P. & H." Gasoline Cranes
McKIERNAN-TERRY Pile Hammers, etc.
CONNERY Asphalt Equip.
CHAIN BELT Concrete Mixers, Saw Rigs, Pavers
NOVO Engines, Hoists, Pumps
"RED STAR" Wheelbarrows
BAUERMAN Cableways
BATES Wire Ties
PULSOMETER & NYE Steam Pumps
PATENT Safety Swinging Scaffolding
TRU-LAY Wire Rope
BUFFALO-SPRINGFIELD Road Builders
SULLIVAN Compressors
PORTABLE Conveyors
ETNYRE Asphalt Distrs.
FLYNN Surfgrader
PAGE Dragline Buckets
MALL Vibrators

Member: Associated Equipment Distributors

PHILLIPS MACHINERY CO.

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Representing

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Austin Machinery Corp.
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Butler Bin Company
Chain Belt Company
Clyde Iron Wks., Inc.
Chicago Pneumatic Tool Co.
General Excavator Co.
Jaakson Mfg. Co.
Manitowoc Engineering Works
Master Vibrator Company
Rogers Brothers Corp.
Sauerman Brothers, Inc.
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Bates Wire Ties
Beebe Bros.
Blystone Mfg. Co.
Broderick & Bascom Rope
Buoyrus-Erie Co.
Buffalo-Springfield Roller Co.
Butler Bin Co.
Chain Belt Co.
Climax Eng. Co.
Concrete Surf. Machy. Co.
D-A Lubricant Co.
Detroit Graphite Co.
R. E. Dietz Co.
Duff-Norton Mfg. Co.
Fairbanks, Morse & Co.
Fate-Root-Heath Co.
Homestead Valve Mfg. Co.
Kalamazoo Ry. Supply Co.
LaSol Co.
The Linde Air Products Co.
M. & M. Wire Clamp Co.
Mall Tool Co.
Niagara Mfg. Co.
Red Star Products Co.
Sasgen Derrick Co.
Sheldon Mfg. Co.
Sterling Machinery Corp.
Sterling Wheelbarrow Co.
Sullivan Machinery Co.
Sunbeam Mfg. Co.
Templeton, Kenly & Co.
Willamette Hyster Co.
"Williams" Buckets, etc.
Young Iron Works

Member: Associated Equipment Distributors

BOEHCK EQUIPMENT CO.

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Representing

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Byers Machine Co.
Corrugated Steel Sheet Piling Corp.
Electric Tam. & Equip. Co.
Hauck Mfg. Company
Hercules St. Products Co.
Homestead Valve Mfg. Co.
Iowa Manufacturing Co.
Independent Pneumatic Tool Co.
Jaeger Machine Co.
C. S. Johnson Company
Jones-Superior Machine Co.
Lambert Automatic Skip Co.
LeRoi Co.
A. Leschen & Sons Rope Co.
Lima Locomotive Works
McKiernan-Terry Corp.
N. P. Nelson Iron Wks., Inc.
Portable Machinery Company
Red Star Products, Inc.
Rogers Bros. Corp.
Sasgen Derrick Co.
Superior Concrete Accessories, Inc.
Wellman Engineering Co.

Member: Associated Equipment Distributors

CUNNINGHAM-ORTMAYER CO.

429 W. Michigan St. Milwaukee, Wis.

Allen Road Maintainers
Blaw-Knox Truck Mixers
Butler Bins, Batchers
C.H.&E. Pumps, Hoists, Saw Rigs
Case Tractors and Mowers
Cleveland Formgrader Parting Equipment
Eagle Crushers
Flexible Road Joint Machines
Flexible Sewer Cleaning Equipment
Gallon Iron Graders, Rollers and Spreaders
Good Roads Snow Plows
Handlan 100-Hour Lantern, Torches
Heltzel Steel Road Forms
Ingersoll-Rand Air Compressors, Tools
Insley Power Shovels, Conc. Mixers & Buckets
Koehring Conc. Mixers, Cranes, Shovels, etc.
Kwik-Mix Conc. Mixers
Littleford Distributors, Tar Kettles, Heaters
Multiplex Conc. Block Eq.
Omaha Dragline Buckets
Owen Clamshell Buckets, Grapples
Pneedle Spray Painting Eq.-ip.
Parsons Trenchers
Roeth Conc. Vibrators
Tuthill Hwy. Guard Rail
Wood Tarpaulins
Whirlwind Power Lawn Mowers
Wire Rope Corp. of America
Woodridge Scrapers

Member: Associated Equipment Distributors

DROTT TRACTOR CO., Inc.

3841 W. Wisconsin Ave.

Milwaukee Wisconsin

Representing

ALLIS-CHALMERS Tractors, Graders, Speed Patrols, Hauling and Power Units
OSHKOSH 4-Wh.-Drive Trucks & Earth Movers, 6-Wh. steer, 6-Wh. drive
PIONEER Gravel and Rock Crushing Equipment
WAUSAU Snow Plows
LaCROSSE Trailers
DROTT Angledozers, Bulldozers, Scrapers, Scarifiers, Snow Plows, Hydraulic Equipment, etc.
GENERAL MOTORS DIESEL Packaged Power Units
KOB Sand Spreaders
HERCULES Road Rollers
RUSSELL Scrapers, Plows
HOUGH Loaders, Sweepers
JOY Snow Loaders
GAR WOOD Dirt Moving Scrapers

Member: Associated Equipment Distributors

Contractors and Engineers Monthly

Walsh Construction Co. is using the Pumpcrete method of concreting on Contract 316 of the Delaware Aqueduct.

C. & E. M. Photo

Spreading Amiesite base in Delaware with an Adnun paver fed by a Ford V-8. See page 31.

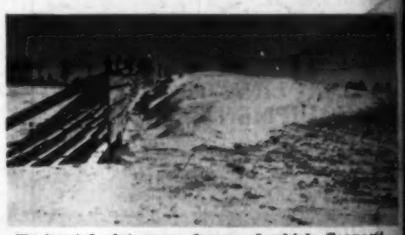
C. & E. M. Photo

A state-owned Lorain 55 loading a GMC truck on a Kentucky farm-to-market road.

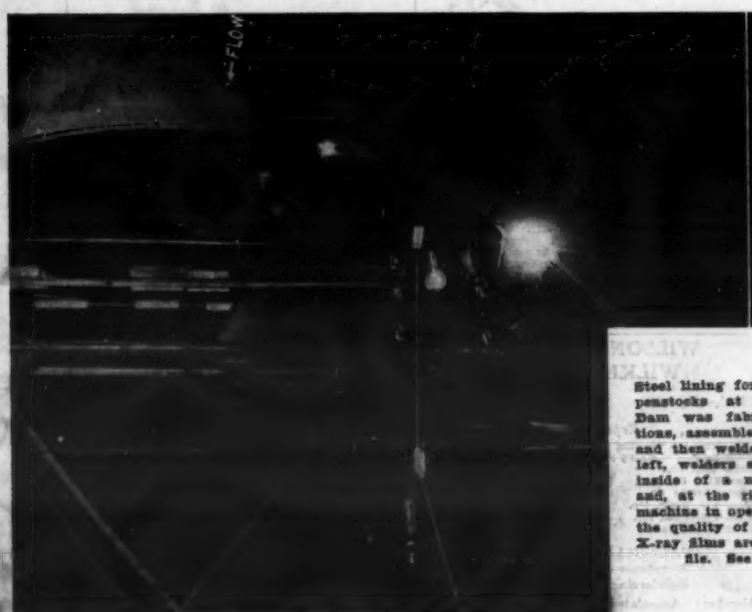
A map of the Delaware Aqueduct, a 117-mile water tunnel which will increase New York City's water supply by 540,000,000 gallons daily. See page 1.

The discharge end of Walsh Construction Co.'s Pumpcrete line on Contract 316, showing concrete being pumped into invert forms.

This Michigan power shovel with 1½-yard snow bucket on a heavy-duty truck makes short work of drifts in Connecticut. See page 7.



Horizontal slat snow fence, of which Connecticut uses 139,360 feet, proves very effective in preventing drifts on the highway.



Steel lining for the main-unit penstocks at Grand Coulee Dam was fabricated in sections, assembled and installed and then welded together. At left, welders at work on the inside of a main-unit lining and, at the right, the X-ray machine in operation, checking the quality of the welds. All X-ray films are being kept on file. See page 28.